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Further Cut in Print Paper is Deferred

Conference of U. S. and Canadian Officials Clarifies Pulpwood and Wood Pulp Situation—WPB Announces no Curtailment Before July 1—Canada Will Ship 1,550,000 Cords of Pulpwood This Year.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 10, 1943—There will be no further curtailments in the use of print paper in newspapers, magazines, books, and commercial printing at least until after July 1, it has been announced by the WPB.

This situation is made possible by confirmation by Canadian authorities of their undertaking to furnish for shipment to the United States 1,170,000 tons of wood pulp plus an additional 107,000 tons which the Canadian government will call upon its pulp and paper industry to supply within the next few months. This wood pulp is in addition to shipments of newsprint from Canada.

R. L. Weldon, Canadian newsprint administrator, advised WPB on February 20 that an unexpected amount of wood had been cut during the winter in Canada. Accordingly, the Printing and Publishing Division of WPB announced that the proposed second curtailment in the use of newsprint of not to exceed 10%, effective April 1, would be held in abeyance.

Additional Pulpwood Needed in U. S.

However, the need of an additional supply of pulpwood, over and above the amount previously assured by the Canadian authorities, was imperative for the manufacture of other grades of paper in the United States unless further cuts in use were to be applied to users of print paper other than newspapers.

To that end and to clarify the entire pulp and paper situation in the best interest of the war program of both countries, representatives of WPB, the Canadian Pulp and Paper Administration of the Wartime Prices and Trade Board, and the Timber Controller of the Department of Munitions and Supply of the Dominion of Canada met for a two-day conference in Montreal on Tuesday and Wednesday of last week.

Following this meeting, Mr. Weldon and A. G. Wakeman, Director of the Pulp and Paper Division, WPB, made the following statement:

"The supply of pulpwood made available from this season's cut and now in sight at Canadian mills makes it possible to provide additional wood pulp to meet the urgent need of the United States. Canada's previous undertaking to furnish for shipment to the United States during 1943, 1,170,000 tons of wood pulp has been reviewed and confirmed. In addition, Canadian Newsprint Administrator R. L. Weldon will call on the Canadian industry to supply a further 107,000 tons of wood pulp within the next few months."

To Check Pulpwood Supply Situation

It was pointed out that the supply of pulpwood is subject to unpredictable changes and therefore the two administrations have arranged to watch this whole situation closely and to make the matter the subject of a further review toward the end of April. At that time it also will be determined whether any additional supply of wood pulp can continue to be made available during the second half of the year.

According to WPB authorities, A. H. Williamson, Canadian Timber Controller, has given assurance that authorizations for the shipment to individual mills in the United States of 1,550,000 cords of pulpwood will be made to destinations at the direction of WPB.

Salesmen May Drop Golf Outings

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 8, 1943—It is expected that the western division of the Salesmen's Association of the Paper Industry will have its new committee personnel all ready for public scrutiny next week. Sectional vice-president Burt Fisher will select chairmen for the membership and educational commitees, already having R. D. "Pat" Patterson as his right bower as assistant vice-president. The golf chairman, Henry Berge of Appleton Coated Paper Company, has already been selected, but the salesmen are by no means certain that they will continue the series of five golf outings during the summer months to come. The issue was a debatable one as long ago as last summer and now with transportation difficulties increased it will be up to the members to make a new decision. It is expected that the program will be approved as in past years or dropped for the duration by the time another meeting comes around.

Wisconsin Commission Reports on Survey

Study of Forest Resources Indicates State is Making Excellent Progress Toward Supplying its Main Source of Pulpwood — Bill Would Increase Unemployment Compensation — Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., March 8, 1943—How Wisconsin is swinging back to the day when it can again become its own main source of pulpwood and other timber is shown in a ten-year survey of tree production and planting described by W. H. Brener, of the forests and parks division of the Wisconsin Conservation Commission.

Since 1931, when a study was made of the needs of increased reforestation, there have been supplied from state-operated nurseries for public and private planting nearly 200,000,000 trees, mostly the species needed by the paper and lumber mills. This total does not include the tremendous plantings made on the extensive federal forests in the state.

F. G. Kilp, chief forester of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., assisted the conservation commission in its 1931 survey, resulting in a recommendation that the forest planting program should include 8,000 to 10,000 acres per year. The policy adopted also stipulated that the plantings should be in areas readily accessible to locations of the principal wood-using industries.

Finding that the state's only nursery at Trout Lake was inadequate, the Nekoosa-Edwards company donated a 20-acre tract for a new nursery in Wood County, where its own forest plantations and nursery are located and have been under operation for a number of years. The new nursery was supplying seedlings by 1934 and since then additional nurseries have been established in Douglas County and at the state prison camps at McNaughton and Athelstane, Wis.

The acreage goal of plantings has been well maintained in each of the ten years since 1931 except for 1933, when drought was too prevalent. Plantings increased from 6,581,815 trees in 1932 to an all-time high record of 37,589,006 in 1940. Labor shortages caused a decline to 24,350,775 in 1941. Only the spring planting figures are available for 1942, when 17,740,436 trees were set out. As many as 12,532 acres have been planted within one year.

The Nekoosa-Edwards company has also cooperated with the University of Wisconsin and the U. S. Department of Agriculture to set up experimental nurseries where investigations are being carried on in the possible propagation of disease-resistant varieties.

Plantings in private forests have averaged approximately 9,000,000 trees annually for the last three years, and public forests have utilized as high as 28,000,000 trees per year. The largest private forests aside from those of the Nekoosa-Edwards mill are those of the Consolidated Water Power and Paper Company and the Tomahawk Kraft Paper Company. Their combined plantings have averaged over a million trees annually for the last several years. Survival records have been unusually high, assuring that Wisconsin's forests are definitely on the way back.

Bill Would Increase Unemployment Benefits

Wisconsin mills will be asked to increase the amount of their unemployment compensation reserves if changes proposed in the present law by the Wisconsin Industrial Commission are passed at the current session of the Legislature.

The commission points out that wartime industrial expansion has brought 200,000 new workers under the law while the rate of contribution has remained the same. It points out that the end of hostilities will mean large layoffs and resultant heavy benefit payments.

Wisconsin's present unemployment reserves amount to more than $85,000,000, but post-war benefit payments are apt to total considerably more than this figure, even if the readjustment period is fairly short, the commission states.

Another reason given for higher contributions is the adjustment of benefits to the rising cost of living during the war. The schedule now ranges from $2 weekly to a top of $17, weighted in favor of the employees in the lower wage brackets, with maximum benefits for 20 weeks in any single unemployment period. "More adequate unemployment benefit protection can and should be provided for Wisconsin workers," the commission sets forth.

Another revision is asked by the Industrial Commission with respect to the minimum wage law for women and minors. It now requires compensation of not less than 22½ cents per hour. Voyta Wrabetz, chairman of the commission, explains that the present minimum standard is meaningless because of war conditions, which have forced wages upward in almost all lines. The present minimum, he says, is below the standard of the pre-depression years of the 1920's.

WLB Approves Wage Increase

A wage increase of five cents per hour has been approved by the War Labor Board for employees of the Nicolet Paper Corporation, De Pere, Wis., to correct "maladjustments resulting from the rise in the cost of living" in accordance with the wage stabilization policy. The increase was unanimously approved, and is retroactive to October 4, 1942. The locals of the International Brotherhood of Papermakers and the International Brotherhood of Pulp, Sulphite and Paper Mill Workers (AFL) were parties to the negotiations, involving approximately 120 workers.

Two Mills Damaged by Fire

The Martindale Pulp Wool Insulation Company's plant at Marinette, Wis., was destroyed by fire the evening of March 4, with an estimated loss of $9,000 to building and contents. It is believed that friction from foreign metals in the insulation material caused sparks to ignite paper cuttings in a cutting machine. The fire was discovered about

an hour after the plant was shut down for the day. It took the city fire department seven hours to extinguish the blaze.

Considerable damage also was done to the main offices of Kimberly-Clark Corporation at Neenah, Wis., by a fire starting about 6 o'clock the evening of March 4. It started in a closet on the second floor and spread through the walls to the attic, requiring an hour to extinguish.

Watermark Expert Uncovers Fraud

Joseph J. Plank, president of the J. J. Plank Company, Appleton, Wis., manufacturers of dandy rolls, was instrumental in detecting a fraudulent will recently. He was able to prove from the watermark in the paper upon which the will was written that the paper was not manufactured until several years after the document was supposed to have been executed. A nationally known handwriting expert thus was able to prove his case of fraud.

Joseph Conway on WMC Committee

Joseph M. Conway, president of the Hoberg Paper Mills, Green Bay, Wis., has been appointed by the War Manpower Commission on a labor stabilization committee for ten northeastern Wisconsin counties. Representatives of labor and management will assist in preventing wastage of manpower, prevent pirating of labor, and assuring an adequate labor supply.

Additional Committeemen Volunteer

The following additional committeemen have volunteered to serve under Adam K. Luke, vice-president and treasurer of the West Virginia Pulp and Paper Company, for the 1943 Red Cross War Fund which launched the campaign for 13 million dollars for New York City on March 1:

PAPER MERCHANTS COMMITTEE: John J. Dillon, vice-president Geo. W. Miller & Co., Inc.; Morris Schlosser, president Schlosser Paper Corporation; Oswald F. Marquardt, president Marquardt & Co., Inc.; Samuel T. Barron, vice-president Royal Paper Corporation; A. W. Pohlman, president A. W. Pohlman Paper Company, Inc.; Robert J. Rudnick, treasurer Mutual Paper Company, Inc.; George Stoll, vice-president Reliance Paper and Twine Corporation; L. A. Hughes, assistant secretary Charles F. Hubbs & Co.

The following committee supersedes the Paper Box Committee listed in the March 4, 1943, issue of the PAPER TRADE JOURNAL:

PAPER BOX COMMITTEE: Chairman, Samuel Kipnis, president National Container Corporation; Secretary, Lionel M. Goldberg, vice-president National Container Corporation.

FIBRE CAN AND TUBE DIVISION: W. L. Stevens, vice-president Improved Mailing Case Co.

FOLDING BOX DIVISION: George E. Dyke, president Robert Gair Company, Inc.

PAPER BOX DIVISION: W. Conescu, president Spear Box Company, Inc.; G. J. Dubey, vice-president Albert Paper Box Company, Inc.

CORRUGATED CONTAINER DIVISION: David Rous, sales manager Grand City Container Corporation; Max Ross, secretary Fibre Box Association.

SET-UP BOX DIVISION: Adolph Dorfman, president A. Dorfman Company, Inc.; Harry E. Roden, secretary N. Y. District Paper Box Association.

The Paper Laboratory at Tacoma

E. D. Rich, who has been visiting in New York, tells an interesting story about the Cellulose Products Laboratory which, about two years ago, was organized in Tacoma, Wash., to engage in commercial research for the pulp and paper industry. This laboratory was started at the request of several small paper manufacturers selling their products through Herman Scott Chalfant, Inc., of New York City, for the purpose of developing paper specialties for their mills.

At first the laboratory occupied a store room in Tacoma. During the first year it expanded very rapidly and by last May, it was necessary to obtain larger quarters. At that time a factory building was purchased and the front half of the building was modernized and rebuilt into a laboratory. In the back half of the building, machinery for paper coating and impregnating work was installed.

The Cellulose Products Laboratory now rates as one of the largest commercial research and testing laboratories in the United States. Its staff includes a large number of experienced men in the pulp and paper field. E. D. Rich, director of the laboratory, has had many years of experience in the technical departments of the Crown Zellerbach and Rayonier mills. He was technical director for the Oregon Pulp and Paper Company prior to organizing the laboratory in Tacoma. A. M. Cadigan, chief chemist, was formerly chief chemist for the St. Regis Paper Company. The staff at present includes 22 technologists and experts in the various departments of pulp and paper manufacturing and paper coating.

The purpose of the commercial machinery in the laboratory is to allow laboratory projects to be produced on a commercial scale and markets developed for these products before they are turned over to the manufacturer. This problem of conversion from laboratory to mill and of market development is a tremendous cost factor to many paper producers and represents a big advantage in the use of the laboratory's services.

The laboratory is in a position at the present time to accept additional work in connection with the development of new or better paper specialties or for paper testing.

Cellulose Products Laboratory is a division of Richaven Company with offices at 754 Broadway, Tacoma, Wash.

Cleveland Container Leases Building

[FROM OUR REGULAR CORRESPONDENT]

OGDENSBURG, N. Y., March 8, 1943—Announcement is made here that the Cleveland Container Corporation, manufacturers of fiber and plastic containers, has taken a lease of the building vacated by the International Harvester Company and operations will be started within a few weeks. About 75 persons will be employed by the Cleveland concern which believes that it will be able to find jobs for many of the workers who will be affected by the closing of the Algonquin Paper Mills within a short time. The concern is reported to have fourteen plants in operation in various parts of the United States. Officials expressed satisfaction at the way they had been treated in negotiations and declared that they saw no reason why the plant should not expand.

WPB Orders Allocation of Container Board

Manufacturers of Kraft and Jute Boards Are Directed to Set Aside 25% of Monthly Output to Producers of V-Boxes For Armed Forces and Lend-Lease — Order Becomes Effective on April 1.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 10, 1943—Beginning with the month of April, container board mills are directed to set aside 25% of their monthly kraft and jute container board production for allocation by WPB to container manufacturers making V-boxes for the armed forces and Lend-Lease, under the terms of Conservation Order M-290, announced today by the Director General for Operations.

V-boxes are a new type of shipping container made from solid or corrugated fibre and developed to replace wood for many military and Lend-Lease export shipments.

The kraft container board subject to the order includes any grade of container board suitable for the manufacture of corrugated or solid fiber containers which uses 50% or more virgin sulphate wood pulp. Jute container board includes any grade of paperboard commonly used as a liner, corrugating medium, or filler stock in the manufacture of corrugated or solid fiber boxes. This applies to grades commonly known in the container board industry as jute, straw, chestnut, container chip, and "bogus" corrugating materials.

About one-fourth of the container manufacturers have necessary facilities to produce V-boxes. The order will assure distribution of container board to such manufacturers. It will help to relieve the shortage of wood boxes for export shipment.

Each Mill Must File Advance Report

Each mill is required to file an advance report on the amount of its reserve for the coming month, and on the orders it has received against that reserve for V-boxes. The report is made on Form PD-819. The report for April is due March 15, and reports for subsequent months are due on the 10th of the preceding month.

The amount of the reserve is 25% of the projected supply, which is computed by totaling:

1. Estimated tonnage of inventory expected to be on hand on the first of each month.
2. Estimated monthly tonnage production of container board during the month.
3. Any overage from the second preceding month. This provision is designed to offset any deficiency in advance estimates of future production. (The provision does not apply until June.)

After making such computation, each mill is required to reserve facilities to produce and ship, during the coming month, 25% of the projected supply of kraft container board and 25% of the projected supply of jute container board for allocation to container manufacturers. The reserve production must be in addition to any other production required to be set aside by Conservation Order M-241 (Paper and Paperboard), or by any other WPB order.

The Director General for Operations may direct any mill to produce the allocated quantities in specified grades and ship them to designated container manufacturers.

Allocations may be made first only to box manufacturers who have V-box orders. Then, if any balance of reserves is left, allocations for other essential containers will be considered. Only containers listed under Preference Rating Order P-140 (Wooden and Fibre Shipping Containers) will be considered for such allocation.

Allocation directions of the Director General for Operations take precedence over all other orders for container board, whether rated or unrated.

Mills are required to prorate the unreserved production equally among all their contracts and commitments, and make deliveries accordingly. Allocation deliveries may not be included in the prorated quantities. This is considered necessary to prevent disruption in the production of other essential containers.

Box manufacturers may use reserve container board only for the production of V-boxes or such other containers as may be authorized by the Director General for Operations.

If a container manufacturer plans to make V-boxes, he must file Form PD-820 with WPB specifying his expected production for the coming month. In addition, he may include in the form a request for an allocation of container board for the production of V-boxes. However, he first must have filed order for the container board with his supplier. The form for April must be filed on or before March 9. Thereafter, it must be filed not later than the first of each month.

Conditions Required By WPB

A container manufacturer may file Form PD-821 with WPB for an allocation of container board for use in making essential containers other than V-boxes. However, the following conditions must exist:

1. He cannot manufacture such containers from his existing or prospective container board supply without interrupting or eliminating the production of other essential containers.
2. Persons ordering the containers cannot readily obtain them from other sources.
3. His prospective supply of container board for the coming month is to be curtailed as a result of having to set aside 25% of his production.
4. His efforts to obtain replacement of such reduction from other suppliers have been unsuccessful.

The first form must be filed on or before March 15. Thereafter, it must be filed not later than the 10th of each month.

Boston Paper Merchants Handicapped

BOSTON, Mass., March 8, 1943—Paper distributors here are having a much greater demand for their goods than they are able to fill, due to transportation difficulties and production being cut at the mills on account of loss of man-power.

Don't let DIRT *Get* YOU *Down*

Stock comes dirtier than ever. And you can only combat it with whatever means are already at hand —for war equipment comes ahead of dirt removal equipment.

But don't take it lying down! We're helping a lot of other mills to make the most of their existing Screens and other dirt removal equipment. Maybe we can help you, too. At any rate we'd be glad to try. Building the bulk of this continent's machinery for keeping dirt out of paper qualifies us as headquarters for information and assistance on the subject.

So let us hear from you whenever a paper dirt problem develops.

BIRD MACHINE COMPANY

South Walpole · Massachusetts

Canada Not Satisfied With Newsprint Price

Although New Price of $54 a Ton Will Amount to $4.40 and $12 Million Additional Revenue This Year, Rise is Considered Inadequate — Transportation is Big Factor in High Current Costs.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 8, 1943—The permitted $4 a ton increase in the price of newsprint has been made effective March 1 by all the newsprint manufacturers in Canada and also in Newfoundland by Bowater's Newfoundland Pulp and Paper Mills, Limited. As the increase is in United States funds, it will amount to $4.40 in Canadian funds on the tonnage exported. On this basis it is estimated that Canadian manufacturers stand to receive an estimated $12,000,000 additional revenue in Canadian funds for the balance of this year.

New Increase Not Satisfactory

At the same time Canadian producers are not satisfied with the $4 increase, the contention being that an increase of at least $10 a ton should be granted to compensate for the increase in costs during the past five years. In some other industries the government has met higher costs through subsidies. Thus government payments are being made to textile industries to take care of the rise in U. S. cotton prices which have advanced textile production costs and endangered price ceilings. A complicating factor in the newsprint industry is that the bulk of the production is for U. S. consumption and that the Canadian government could hardly in equity devote Canadian taxes to keep down the price of newsprint in the United States.

Transportation A Major Cost Factor

One of the major factors increasing expenses of newsprint makers has been the sharp jump in transportation costs. Instead of using water transport to many important consuming centers, manufacturers have been forced to use costly rail haulage through the United States. Inasmuch as price schedules were based on cheap water transport rates, result has been sharp increases in transportation outlays. In addition, pulpwood costs and other items have increased.

Satisfaction is being expressed here, both by producers and publishers, that a second cut in the production of newsprint of not more than 10%, which would have been effective April 1, has been held in abeyance, following the report of the Canadian Newsprint Administrator R. L. Weldon, that the cut of pulpwood in Canada this winter had been larger than at one time it was thought it would be.

A factor now demanding attention is the demand from the United States for additional supplies of pulp to manufacture grades of paper other than newsprint unless further cuts are to be applied to books, magazines and other uses of print paper.

Shipments of 1943 Pulp Tonnage Confirmed

Following conferences between the Canadian and American Newsprint Controllers and the Canadian Timber Controller, Canada's previous commitment to furnish for shipment to the United States this year 1,170,000 tons of pulp, has been confirmed, and in addition the Canadian Newsprint Administrator is now asking the industry to supply a further 107,000 tons of pulp within the next few months. Whether or not this is possible remains to be seen. The situation is to be reviewed again towards the end of April, and then it will also be determined whether or not any additional supply of wood pulp can continue to be made available during the second half of the year. The whole plan, in the words of the official statement, is being considered in the light of "furtherance of the objective that the industrial resources of Canada and the United States be utilized to the best interest of the war program in both countries."

Algonquin to Close Plant

[FROM OUR REGULAR CORRESPONDENT]

OGDENSBURG, N. Y., March 6, 1943—The Algonquin Paper Corporation will close its newsprint mill on March 7, according to announcement. Previously, an official had stated that that mill's production had been cut 20% and that another cut was imminent. Frank A. Augsbury, president, attributed the projected shutdown to a combination of government orders limiting output and prices and shortage of labor and uncertain wood supplies. Last year shipments were threatened by the submarine menace in the Gulf of St. Lawrence. It was announced also that the paper mill's sulphite division, employing about 75 persons, would be kept in operation and enough pulpwood is said to be on hand to guarantee sulphite operations until spring. Normally, the Algonquin, one of the largest mills in the state, employs about 700 men and functions seven days a week. In recent months, however, the 4,000 ton monthly output has been reduced to 2,500 and a schedule of five days a week was instituted. An official promised that the plant would resume full production as soon as conditions permit.

Rourke-Eno Chooses Two Directors

[FROM OUR REGULAR CORRESPONDENT]

HARTFORD, Conn., March 1, 1943—Two new directors were elected by stockholders of the Rourke-Eno Paper Company at the recent annual meeting. They are Ernest E. Ludwigson and George L. Ray.

Mr. Ludwigson is the senior employee of the organization, having been associated with the company for 40 years. He is in charge of sales in the wrapping paper division. Mr. Ludwigson is a resident of New Britain.

Mr. Ray, who attended Wassookeag School at Dexter, Me., and Deerfield Academy, has been identified with the company 12 years. He resides in West Hartford.

Other directors are William H. Rourke, Bulkeley VanSchaack, W. E. A. Bulkeley and Daniel L. Rourke.

Delaware Valley TAPPI Discuss Formation

Formation on cylinder and fourdrinier papermaking machines was the principal subject of Arno W. Nickerson at the regular meeting of the Delaware Valley Section of the Technical Association of the Pulp and Paper Industry, Engineers Club, Philadelphia, Pa., on March 5, 1943. Mr. Nickerson discussed in detail some of the features of the designs of the headboxes of Beloit Iron Works, Pusey and Jones Corporation and Downingtown Manufacturing Company. His talk in brief is given below:

There is very little in the literature on this subject and the object of this discussion is to stimulate interest along this line. There is much that both the machine builders and the users can do to improve formation.

New designs include improvement in adjusting level of stock, counterflow and directional flow vats with a single overflow arrangement designed to improve formation.

The trend is to design these systems to eliminate foam in every point possible before it reaches the headboxes. The Downingtown approach of an improved design has a submerged approach flow to the screen. The mixing is done in the line before reaching the headbox in all of these systems but by various means.

The tendency is to eliminate large headboxes—and headboxes as found on the older machines are disappearing on present designs.

The new improved machine designs cannot be installed for the duration of the war, so make-shift improvements are all that can be installed to meet present needs until the better designed machines are available.

In a large Canadian newsprint mill, one half of the headbox was cut out and baffles installed to cut down the time the stock remained in the headbox. The formation of the sheet was greatly improved. They had been using too little water, but you can get flocking no matter how much water is used if the velocity of the stock in the headbox is not correct for the type of equipment and the stock. Formation on the wire should take place before the stock has time to flock. This depends on many factors—velocity, time in the headbox, type of stock, etc. Proper mixing of stock should occur before reaching the headbox, and the time in headbox should be controlled to get the proper formation.

Several ways of calculating the flocking time was suggested. One was allowing a thoroughly agitated stock to flow over a blue glass plate, recording the length of time required for small flocks of stock to form as it flows down the plate. This time varies from 1½ to 13 seconds and differs with the various grades of stock. Soda and groundwood pulps and other grades containing a large percentage of fine require a short interval of time while very free virgin kraft will take much longer time to floc.

The best formation is obtained by getting the stock on the screen just before it beigns to floc. In calculating the required velocity or the size headbox to get best results, the following factors are obtained.

$$\text{Velocity of flow, in ft./sec.} \quad \text{Detention Time in Seconds} = \frac{\text{Cu. ft.}}{\text{Cu. ft./sec.}}$$

$$\text{Vel.} = V^2 = 2gh$$

V = vel. in ft./sec.
g = vel. due to gravity = 32 ft./sec.
h = head in inches.

The question of cascading the stock to eliminate or produce foam or deareating the stock was discussed. There was no trouble along this line in the particular system described. There was a danger of obstructions forming in the altered headbox and a spinning action at that point. Turbulence would be taking the place of velocity. In a submerged type of installation, turbulence is not an objection and is good as long as it does not back up the air into the stock.

The kind of paper you make determines the amount of fines passing through a 150-mesh screen. In some stocks as much as 50% fines will pass into the white water vat and 25% into the couch pit. It is most important that some constant and reliable means of mixing the fines in the white water into the dilution system of the stock approach lines leading to the headbox. Only 8-12% fines are lost in the white water when making 35-50-pound kraft. The point of mixture of these fines with the stock can take place almost anywhere in the line, but it is important for good control over formation that it be kept as close to the formation box as possible.

Those in Attendance

Among those present were: Edw. J. Albert, C. S. Albert, A. R. Bechtel, Miss D. A. Beisminger, Samuel M. Bratton, William J. Burke, L. K. Burnett, D. D. Cameron, C. M. Connor, O. C. Cordes, George H. Ditwiler, J C. Dieffenderfer, Paul Easton, J. Edge, Harrison J. Farra, E. N. Glauner, J. F. Good, R. E. Green, Lois V. Hans, H. F. Hoffmann, Eugene A. Holland, C. C. Irving, George J. Lane, R. G. Macdonald, Louise E. McGrath, Alex. McInnes, Geo. B. Martin, H. C. Merritt, Arno W. Nickerson, E. N. Poor, Lt. R. J. Proctor, F. M. Sanger, W. K. Schlotterbeck, Edw. A. Shallcross, Wm. M. Shoemaker, Chas. A. Shubert, E. T. Street, R. J. Stuart, Jr., and A. H. Webber.

Regional Meetings Dates Revised

The National Paper Trade Association announces that certain changes have been made in the regional meetings schedule originally announced and printed in the PAPER TRADE JOURNAL of March 4. The dates now are as follows:

Monday, March 22, 10:00 A.M.—Rueger's Hotel, Richmond, Va.

Wednesday, March 24, 10:00 A.M.—Ansley Hotel, Atlanta, Ga.

Friday, March 26, 10:00 A.M.—Baker Hotel, Dallas, Tex.

Monday, March 29—Los Angeles, Cal.

Tuesday, March 30, 10:00 A.M.—St. Francis Hotel, San Francisco, Cal.

Friday, April 2, 1:00 P.M.—Cosmopolitan Hotel, Denver, Col.

Saturday, April 3, 10:00 A.M.—President Hotel, Kansas City, Mo.

Monday, April 5, 10:00 A.M.—Palmer House, Chicago, Ill.

Wednesday, April 7, 10:00 A.M.—Columbus Athletic Club, Columbus, Ohio.

Thursday, April 8, 10:00 A.M.—Detroit-Leland Hotel, Detroit, Mich.

Friday, April 9—Syracuse, N. Y.

Monday, April 12—Boston, Mass.

Tuesday, April 13—New York City.

Longer-Lived Digester Parts

Pulp mill operators are well aware of how, in the sulphite process, corrosion is constantly at work — shortening the life of metallic digester parts. This destructive action is caused by the excess of free sulphur dioxide in the solution used, and accelerated by the operating temperatures.

Unless digester parts are made of a metal with unusual resistance to corrosion, replacements will be frequent and maintenance costs excessive. Also involved is a waste of metal, a matter of real importance in wartime. It was long ago discovered that digester parts of ordinary iron or steel would not do.

400,000 Volt X-ray in Chicago Plant

To meet the growing need for castings which would withstand the corrosion and high temperatures of digester service, Amsco-Brake Shoe developed its Amsco Alloy grade F-12, "the paper mills' own alloy," which conforms rigidly with TAPPI specifications.

Amsco Alloy F-12 embodies maximum resistance to the corrosion and heat encountered in digesters. Besides saving metal because of its long life under corrosion, it effects operating economies from its load-carrying strength at high temperatures, and from its ready machinability.

Amsco Alloy F-12 castings are produced under close laboratory and metallurgical control. The internal structure of specimen castings is inspected by Amsco's 400,000-volt X-ray equipment to detect internal defects if any exist. This "inside information" makes it possible to eliminate such defects in subsequent production.

Digester parts which have been made of Amsco Alloy F-12 include steam nozzles and rings, blow valve bodies, sleeves, valve discs, gage glass plugs and fittings, wedges, seat rings and flanges.

Carter, Rice & Co. Elect Officers

[FROM OUR REGULAR CORRESPONDENT]

Boston, Mass., March 8, 18943—Charles A. Esty was elected president of Carter Rice & Co. Corporation at the annual meeting March 1. Hubert L. Carter was elected vice-president; F. H. Winter, secretary, and P. A. McGreenery, treasurer. Directors elected were as follows: H. L. Carter, W. L. Carter, E. A. Carter, E. A. Crowell, C. A. Esty, J. R. Halkyard, P. A. McGreenery, R. H. Welsh, and F. H. Winter.

Paper and Cordage to Play Golf

[FROM OUR REGULAR CORRESPONDENT]

Philadelphia, Pa., March 8, 1943—The Philadelphia Paper and Cordage Association, Inc., is one organization which is going to carry on in golf through this season.

W. J. Culverhouse has lined up a schedule right in the teeth of transportation difficulties, help shortages and other difficulties. The boys insist they will lug their golf sticks by foot, trolley, mule-back, or any other available means and unless the clubs actually roll up the courses, will play each event. The schedule is as follows:

April 21—Howard Paper Trophy, at Roxborough Country Club.

May 18—Fort Howard Trophy, Merion Country Club.

June 17—Championship Cup, Schuylkill Paper Trophy, Llanerch Country Club.

July 21—W. C. Hamilton and Sons Trophy, Overbrook Country Club.

August 19—Morgan H. Thomas Trophy, Old York Road Country Club.

September 21—Beveridge Paper Trophy, North Hills Country Club.

October 5—Jessup and Moore Trophy, finals Buffalo Envelope Trophy, Pine Valley Country Club.

Seventy-two hole medal play, through season, for Jack Shinner's trophy.

Gilbert Stevens Made Tech. Assistant

Gilbert Stevens, who has been engaged in production, research and technical sales with Minnesota and Ontario Paper Company for three years prior to last November, was appointed technical assistant to the president. The announcement was made by R. H. M. Robinson, president of the company.

Mr. Stevens' work with Minnesota and Ontario Paper Company has dealt principally with the development of improvements in manufacturing methods of present grades of paper and research on new development in paper coating. He came to the company from the Kimberly-Clark Corporation, where he was in the sales and production department.

During the past several months, Mr. Stevens has served in the Navy Department Bureau of Supplies and Accounts, working on technical specifications in paper purchases for the Navy in Washington, D. C.

Born in Appleton, Wis., he attended the University of Michigan, and in 1927 joined the Appleton Coated Paper Company of Appleton, Wis. His family is likewise associated with the paper business, his brother John Stevens, Jr., being vice-president of the Marathon Paper Mills Company at Rothschild, Wis., and a second brotehr, Henry W. Stevens, being sales manager of Ben C. Betner, Devon, Pa.

To Distribute Greylock Ledger

The Butler Paper Company, Kansas City, Mo., has been appointed distributor in Kansas City and vicinity of Greylock Ledger, the well-known 75% rag record paper made by the L. L. Brown Paper Company, Adams, Mass. This line is being stocked in addition to L. L. Brown's Linen Ledger for which the Butler Paper Company has been the Kansas City distributor for a number of years.

COLOR GETS ATTENTION

COLOR gives added control. It provides quick, positive identification.

In thousands of plants throughout the country, color speeds up operations involving the selection of one item from a group of items—helps prevent costly mistakes. Color is necessary in the efficient handling of forms, messages and the speedy transmission of vital communications. Dyes are also important for identifying many essential packages and labels.

Today new paper products bring new color problems. To help you meet these new conditions, Du Pont dyestuffs technicians offer vast experience with dyes and their proper application. They can help you unite paper and color most effectively and economically. E. I. Du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Dyestuffs Division, Wilmington, Delaware.

DU PONT DYESTUFFS
REG. U.S. PAT. OFF.

DYESTUFFS

BETTER THINGS for BETTER LIVING...THROUGH CHEMISTRY

CONSTRUCTION NEWS

Under limitations order L-41 all projects involving expenditures of more than $5,000 must be specifically approved by the War Productions Board. The status of projects reported herewith under the provisions of the order is not known.—EDITOR.

Grand Rapids, Mich. — The American Box Board Company, manufacturer of box boards, test liners, etc., has approved plans for new addition to mill, consisting of a one-story structure, to be used for expansion in laminating department, with portion given over to storage and distribution. A building permit has been issued and work is scheduled to be placed under way at early date.

Chicago, Ill. — The Celotex Corporation, 910 South Michigan avenue, manufacturer of building board, insulating board, etc., is reported considering expansion in certain plants now given over to the production of new board products developed by company. Program will include installation of additional equipment for considerable increase in present capacity.

Portland, Ore.—The J. E. Berkheimer Manufacturing Company, 9111 Denver street, manufacturer of roofing papers, prepared roofing materials, etc., plans early rebuilding of portion of local plant, recently destroyed by fire, with loss reported close to $50,000, including equipment. Main offices and mill of company are at Tacoma, Wash.

Cleveland, Ohio—The Great Lakes Paper Box Company, 7275 Wentworth avenue, manufacturer of paper boxes and containers, has work in progress on rebuilding of plant recently destroyed by fire, with loss reported at close to $100,000, including equipment, as previously noted in these columns. It is proposed to have structure ready for service at early date. George S. Rider Company, Terminal Tower Building, Cleveland, is architect.

Milwaukee, Wis.—The Milwaukee Waste Paper Company, 2342 North Newhall street, has plans under way for remodeling and improving a one-story industrial building on North Palmer street, near East Walnut street, to be used for expansion in storage and distribution facilities. No estimate of cost announced. Proposed to place work under way at early date. Walter G. Memmler, 1825 East Hartford avenue, and Leigh Hunt, 152 West Wisconsin avenue, Milwaukee, are associated architects.

Newark, Del.—Fire recently damaged a portion of mill of National Vulcanized Fibre Company, Deandale road, manufacturer of fiber products, with loss reported close to $20,000, including equipment. It is planned to replace the damage at once.

Charleroi, Pa.—The Keystone Drum Company, Oliver Building, Pittsburgh, Pa., manufacturer of fiber drums and containers, has work under way on remodeling and expanding former plant of Charleroi Steel Foundry Company, Charleroi, recently taken over for expansion, as previously noted in these columns. A one-story addition will be built. It is proposed to provide machinery and equipment for large output. Buildings are scheduled to be ready for service in near future. Work is being carried out by Siesel Construction Company, 3528 Forbes street, Pittsburgh. Company is now operating branch plants at Butler, Pa., and Pensacola, Fla.

New York, N. Y.—The Tubize Chatillon Corporation, 2 Park avenue, New York, N. Y., manufacturer of rayon products, has secured a patent covering the production of fiber from soy beans. Patent is No. 2,310,221 and has been assigned to the company by Russell O. Denyes, Pittsburgh, Pa. It is said that the new process represents work carried out at Mellon Institute of Industrial Research, Pittsburgh, and that proposed commercial scale production will be carried out after the close of the war.

Hoquiam, Wash.—Rayonier, Inc., Grays Harbor Division, manufacturer of bleached sulphite pulp, is maintaining production on a slightly curtailed basis at mill at Hoquiam, in accordance with previous order of WPB, and will hold to this output schedule until restrictions are removed. Similarly, the Shelton, Wash., mill of the Shelton Division of company, is on a like basis, while the Tacoma plant has been closed down since last November, when WPB order became operative.

Vancouver, B. C.—Insulation Industries, Ltd., 1001 Rogers Building, Tacoma, manufacturer of paper board and other insulation products, is said to have plans under way for new one-story mill in vicinity of city, reported to cost over $60,000, including equipment.

Hercules Develops Dresinates

Diversion of pctroleum sulfonates from cutting oils, required for machining of planes, tanks, and guns, has been met by use of various soluble rosin derivatives developed in peacetime by Hercules Powder Company chemists.

Called Dresinates, this growing family of emulsifiers produced by Hercules from pine wood has been found effective as extenders, and in some cases as complete replacements for petroleum sulfonates, now on allocation.

Extensive laboratory and industrial tests with Dresinates have enabled chemists to reduce the proportions of the war-scarce emulsifiers in cutting oils. It has been found now that blends of a Dresinate and petroleum sulfonate are more stable and more efficient, especially in hard water, than the oil-in-water emulsions obtained with straight petroleum sulfonate.

Products of the Hercules Paper Makers Chemical Department, the Dresinates are currently available without priorities. They are prepared and ready for use, thereby eliminating special cooking procedures and tie-up of equipment costing time and labor. Each Dresinate is uniform in quality throughout.

Known in the trade by such names as mahogany soap, and mahogany sulfonate, the petroleum sulfonates were put on allocation under Order M-188 issued last November. Only limited amounts are still available for the soluble oils needed where metals are cut or formed, to lubricate and cool the tools and dies.

Obituary

Herbert H. Hoffman

Herbert H. Hoffman, secretary of three large paper mills, was buried late last month at Spring Grove Cemetery after services at the Church of the Assumption. He died at his home, Kugler Mill road, Indian Hill, after a five-month illness.

Born in Cincinnati, Mr. Hoffman attended the old Franklin School and the University of Cincinnati. He was a member of the Camargo Club, the Cincinnati Country Club and the Racquet Club. The mills with which he was associated are the Maxwell Paper Company, Franklin, O.; the Aetna Paper Company, Dayton, O., and the Howard Paper Company, Urbana, O.

He leaves his widow, Mrs. Madeline Rowe Huffman; a daughter, Miss Elaine Hoffman, and two sons, Rowe and Hugh Hoffman.

Morris M. Rothschild

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 8, 1943—Funeral services were held Monday of this week for Morris M. Rothschild, Chicago printing and paper executive, who died at his home at the age of 69 years. Mr. Rothschild came to America from Germany as a child. He has been president of the Greenwood Paper Company since 1895 and has also served in an executive capacity with the Midwest Paper Company. Surviving are a widow and two daughters.

Lumberjack Problem in Lumber Supply

"The Army and Navy need wood for about 1200 different purposes. The question now is—how can they get it? The bottleneck in our lumber-for-war program is a shortage of lumberjacks. So many have entered the armed forces and the industries because of higher wages that it has become difficult to produce enough lumber and wood to meet the demands of the war," according to Professor Raymond J. Hoyle of the New York State College of Forestry at Syracuse University.

"It seems," said Professor Hoyle, "that wood can be used for almost everything. The army marches on shoes with wooden core heels, fights with wooden gunstocks, eats on wooden tables when the army is not in active combat. It flies and sails in wooden planes and boats and sleeps on wooden beds. Warehouses, bridges, even manhole covers, door hinges and, more remarkable still, bedsprings are now being manufactured of plywood."

He further states that some of the sawmills and other wood industries in the Nation are closing because they are unable to obtain logs, and that inventories which the industries had on hand are being used up rapidly. "In fact,' 'he says, "about 5 billion board feet were drawn from the inventory stock last year. In other words we are consuming lumber faster than we can produce it."

Professor Hoyle points out that the price of standing timber has not increased to any considerable extent and it will not increase unless ceiling prices on lumber are raised.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending March 6, 1943

STOCKS

	High	Low	Last
A. P. W.	3⅛	2½	2½
Armstrong Cork Co.	33½	31¼	33½
Celotex Corp.	11⅝	10¾	11⅜
Celotex Corp., pf.	88	87	87¾
Certain-Teed Products Corp.	5⅛	4½	4¾
Certain-Teed Products Corp., pf.	48½	44	45½
Champion Paper & Fibre Co.	18⅝	18⅜	18½
Champion Paper & Fibre Co., pf.	105½	103	103¾
Congoleum Nairn Co.	19⅝	19	19⅛
Container Corp. of America	21¾	20⅝	21¾
Continental-Diamond Fibre Co.	13	10½	12½
Crown-Zellerbach Co.	14	13½	13½
Crown-Zellerbach Co., pf.	91	90	90⅜
Dixie-Vortex Co.	12½	12	12
Dixie-Vortex Co.—A	39	36½	38⅞
Flintkote Co.	19¼	17½	19
Robert Gair	3¾	3⅜	3½
Robert Gair, pf.	13	12¾	12¾
International Paper Co.	12	11⅛	11⅜
International Paper Co., pf.	58¾	57¼	58
Johns-Manville Corp.	80¾	77	80¾
Johns-Manville Corp., pf.	....	....	....
Kimberly-Clark Corp.	28⅝	27½	27½
MacAndrews & Forbes	23⅜	22½	22½
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	36¾	36	36¾
Mead Corp.	9½	8¾	9
Mead Corp., pf.—A. 6%	88½	88½	88½
Mead Corp., pf.—B. 5½%	76	76	76
Paraffine Companies, Inc.	39⅝	39¼	39⅝
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	12⅜	11¼	11¾
Rayonier, Inc., pf.	28⅞	28⅞	28⅞
Ruberoid Co.	22⅞	21⅞	22
Scott Paper Co.	41	39¼	39¼
Scott Paper Co., pf.	114	113	113
Sutherland Paper Co.	27½	27½	27½
Union Bag & Paper Corp.	11⅜	9⅞	10
United Paperboard Co.	5¼	4¾	4⅞
U. S. Gypsum Co.	66	64½	65¾
U. S. Gypsum Co., pf.	176	176	176
West Virginia Pulp & Paper Co.	15	14¼	15

BONDS

Abitibi Pulp & Paper Co. 5s '53	....	....	....
Celotex Corp. 4½s '47	102	101	102
Certain-Teed Products Corp. 5½s '48	100½	99	99
Champion Paper & Fibre Co. 4¾s '50	....	....	....
International Paper Co. 6s '55	106½	106¾	106½
International Paper Co. 5s '47	104¼	103¾	104
Mead Corp. 3¼s '55	....	....	....
West Virginia Pulp & Paper Co. 3s '54	103½	103½	103½

New York Curb Exchange

High, Low and Last for Week Ending March 6, 1943

STOCKS

	High	Low	Last
American Box Board Co.	6	5¾	6
Brown Co., pf.	....	....	....
Great Northern Paper Co.	34½	32½	34½
Hummel-Ross Fibre Corp.	4⅞	4¼	4¼
National Container Corp.	11¼	11	11⅛
St. Regis Paper Co.	3	2⅜	2⅞
St. Regis Paper Co., pf.	123	122½	122½
Taggart Corp.	4	3⅝	3⅞

BONDS

American Writing Paper Co. 6s '61	91⅜	90¼	91⅜

A. P. W. Nets $4,024

The A. P. W. Paper Company for the period, July 1, 1942 to Jan. 16, 1943, reports a net profit of $4,024 after taxes, interest on funded debt including interest payable only if earned on $760,487 6% convertible notes and after $49,000 contingency reserve. Net profit for period covering July 1, 1941 to January 10, 1942 was $76,734.

A. W. P. Corp. Nets 61 Cents

The American Writing Paper Corporation reports a net profit for 1942 of $233,937, equal to 61 cents a share, against $353,494, or 86 cents each on 407,862 shares in 1941.

American Pad Files Statement

The American Pad & Paper Co. has filed the following annual financial statement at Boston as required by law: Assets: cash $42,963, accounts receivable from customers $58,351, accounts receivable from others $610, notes receivable $42, merchandise $187,083, pension trust advances $3,542, real estate $40,733, machinery $40,299, furniture and fixtures $3,750, patent rights, etc., $700; treasury stock $30,100. Liabilities: Accounts payable $11,201, salaries and wages accrued $23,488, taxes accrued $4,037, dividend payable $11,581, reserve for Federal taxes $22,500, capital stock $225,000, surplus $110,368.

National Gypsum Loses

The National Gypsum Company for 1942, reports a net profit of $1,048,059, compared with $1,533,816, and net sales were $22,139,798, against $24,253,348. Earnings for the common stock after taxes, $100,000 contingencies, and preferred dividends were 56 cents a share, against 94 cents a share in 1941. Current assets at the year end were $9,224,119, against $9.582,053 a year before, and current liabilities were $2,894,995, against $3,842,073.

Union Bag Defers Dividend

Directors of the Union Bag and Paper Corporation have decided to take no dividend action until the uncertainty of such matters as manpower, fuel oil, transportation facilities, material and production changes, have been further clarified, since developments on any of these matters might affect further earnings and cash position, it was announced recently.

St. Helens Reelects Officers

All officers of the St. Helens Pulp and Paper Company were reelected when the company held its annual meeting in the Imperial Hotel in Portland, Ore., recently.

The reelected officers include Max Oberdorfer, president and general manager; Dr. Robert H. Ellis, Portland, vice-president; Harry T. Nicolai, Portland, chairman of board, and Irving T. Rau, secretary-treasurer.

Scott Co. Nets $2.24

The Scott Paper Company for 1942 reports consolidated net earnings applicable to common shares of $1,496,688, or $2.24 a share, compared with $2.52 a share in 1941. Earnings before taxes of $1,976,698 were $3,894,177, against $3,415,592. Net sales of $31,949,204 were the largest on record and an increase of 18% over previous year, Thomas B. McCabe, president, pointed out.

Gulf States Corp. Conserves Timber

The Gulf States Paper Corporation at Tuscaloosa, Ala., has undertaken a far-reaching program of conserving the vital timber supply in this and other West Alabama counties by re-seeding, and employing proper methods of harvesting usable trees.

While most of the pulpwood used by the paper mill is and will continue to be purchased from private owners, the company has taken steps to assist in providing a continuous supply of wood and assure an even flow over a period of years, officials said.

For several years the paper mill authorities have cooperated with the national campaign inaugurated to prevent forest fires, a movement sponsored by all the large concerns in the nation.

The company has acquired a total of 110,000 acres of cut-over timberland located in Tuscaloosa and other West Alabama counties on which a project of planting 100,000 pine trees has just been completed. All of this land has been placed under the forest protection plan sponsored by the county, state and federal governments.

Plans of the company are to harvest properly the timber from its own land from time to time to assure an even flow of wood and to set an example for other landowners. The harvesting of the timber from its own lands will not interfere with the purchasing of pulpwood from friends and neighbors who also have timber-crops, it was explained.

The paper mill maintains its own forestry department which works hand in hand with state foresters in protecting timber from fire.

One of the four forest lookout towers which have been constructed in Tuscaloosa County bears the name of the late H. E. Westervelt, founder and first president of Gulf States Paper Corporation. The tower at Buhl was named the Westervelt Tower in recognition of Mr. Westervelt's lifelong interest in conservation and a substantial contribution by the company towards the cost of building it. The company has also contributed to the project of building telephone lines connecting forest towers in West Alabama.

Hammermill Salvages Much Scrap

PHILADELPHIA, Pa., March 8, 1943—With another intensive scrap drive underway in Erie, the Hammermill Paper Company reports that it had salvaged more than 800,000 pounds of much-needed metals and other materials in the past six months for Uncle Sam.

In addition to dormant scrap, the Erie mill in the past six months has made available to others a total of one and a half million pounds of waste pulp and waste paper.

A nationally-circulated magazine devoted to America's scrap drive efforts, recently pointed out the record made by the Hammermill plant since its intensive collection of materials for the war effort.

The Hammermill Paper Company organized a special conservation department, headed by L. E. Randecker, 3822 Beech street, and hired a crew of workmen who spend their time salvaging the much needed items for war. The Hammermill scrap has included iron and steel, brass, bronze and lead, rubber, zinc and copper.

These are the days when paper making equipment must prove the dependability claimed for it. Extra strength and structural refinements were built into Appleton machinery as a guarantee of long service and low maintenance. Severe operating demands today show the economy of this policy.

APPLETON

PAPER AND PULP MILL MACHINERY

Your Appleton paper or pulp mill equipment will serve you well for the duration but you better give it more than ordinary care and attention, just to play safe. Nobody knows how long the emergency is going to last.

THE APPLETON MACHINE COMPANY
APPLETON WISCONSIN

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Of.
Henry J. Berger
EDITOR

Vol. 116 March 11, 1943 No. 10

COMING EVENTS IN PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, Twenty-fourth Annual Convention, Commodore Hotel, New York, June 15-17.

PAY AS YOU GO

At the current rate of progress made by the Ways and Means Committee in writing a 1943 revenue act, there appears the disturbing prospect that a double taxation measure may be left in the bill. Difficulty has always accompanied any effort to formulate an adequate revenue act. The problem today, requiring the levying of a very high rate on even very small incomes is hard to solve. Pay as you go advocates are, unfortunately, rather sharply divided on the merits of the schemes submitted. The adoption of the entire Ruml plan, according to those in the House who favor it, would solve the problem as effectively as any other taxation plan likely to be adopted. But the Ways and Means Committee decided against the Ruml plan on the insistence of the Treasury, that the government could not afford to cancel the 1942 tax liability in a year when the President asked for $16 billion in revenue. Consequently, a 20% withholding tax to become effective July 1, is now agreed upon, with a Ruml modification plan, such as the Carlson bill, or some other compromising measure expected to be ultimately adopted.

Pay as you go taxation and a lessening of group competition for economic favors are two important aspects of the anti-inflationary battle, Henry H. Heimann, executive manager-on-leave of the National Association of Credit Men, declares in the association's monthly business review, issued on February 15. "Inflation, like the weather, is something almost everyone is talking about," he points out, "but, unlike the weather, we can do something about it if we exercise will and economic foresight." Up to this point, Mr. Heimann says, "our efforts have been diluted with well-expressed intentions and excess verbiage. We have had the appearance of action but much less of the reality. Yet, unless we can get sound and complete action, and that rather soon, the inflationary trend will become graver and soon there will be little use discussing counter-inflationary measures."

One of the best checks to the inflationary spiral is taxation, Mr. Heimann asserts, for thereby "we remove from the stream of purchasing power some of the force that sweeps prices onward and upward. This session of Congress is already beginning to consider tax proposals. Second to the actual war effort, sound taxation policies can be a prime contribution to the war. While our taxation program must be considered from all aspects, there is now an urgent need for action in one respect. A pay-as-you-go program must be the first order of tax business in Congress. Let us assume that as an individual your tax bill will be $600 for the year or, if in business, that your tax bill will be $60,000. Now, if you had to stop at the bank before your reached your office to make a deposit of $2 or $200 each business day toward your tax bill, it would no doubt be a priority in your daily thinking and activity. Yet such an interest in forthcoming tax legislation is merely the discharge of citizenship responsibilities. Thus each of us can make another contribution to victory in the war and stability in the post-war era. Attention and action now may well mean the difference between insuring the kind of country we profess to be fighting for and one that our negligence might bequeath to us."

In commenting on group favors Mr. Heimann points out that taxation alone will not check the trend toward inflation listing "other aspects worthy of consideration, of which group competition for economic favors is an important one. Farmers, for example," he points out, "contend they need higher prices to maintain their status quo; wage earners want higher wages to offset the rising cost of living; business men claim charges must be increased to meet higher taxes and other costs and thus enable them to salvage a reasonable part of their earnings. Everyone abhors inflation and, in turn, everyone seems to be trying to evade the sacrifices necessary to prevent it. Our fighting men have little choice as to their sacrifices. Is it not time that we ask our pressure groups to stop, look and listen before they unheedingly push inflation further along its devastating path? From the experiences of the last war we know that rising prices are illusory. They add to the total cost of prosecuting the war. They bring maladjustments in wage structures and disagreements that lead to production curtailment. They make necessary the imposition of higher and higher tax rates."

In conclusion Mr. Heimann states: "And, finally, either during or after the war period, the economic assessments in such form as increased taxation, higher costs, and subsequent deflation invariably prove that neither individuals nor the nation can benefit fundamentally. In the end, the wage earner, the farmer, the business man, those who live on fixed incomes, and let not overlook the coming generation, are worse rather than better off because of the easy dollars that were garnered during the war period. These self-evident truths are simple to understand but, nevertheless, each of us needs reminding time and time again."

W. C. Laycock Made a Director

FORT WAYNE, Ind., March 8, 1943—Election of Wendell C. Laycock, local banker, to the board of directors of the Fort Wayne Corrugated Paper Company to succeed Henry J. Bowerfind, featured the annual meeting of the company's stockholders. The directorate renamed all officers who are: H. M. Treen, president and treasurer; William Waterfield, vice-president; Robert P. Getty, vice-president; August F. Stahlhut, secretary; Earl L. Rich, assistant treasurer and controller, and Paul E. Dickmeyer, assistant secretary.

Mr. Treen stated that his company had leased a paper mill in Hartford City, Ind., from the International Paper Company, Southern Kraft division. The mill formerly owned by the local company, was sold to the International five years ago, but has been unused since then. Mr. Treen said the mill is to be reopened to supply extra raw materials for the firm's war contracts.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1943		Corresponding Weeks—1942	
January 23	88.2	January 24	105.0
January 30	87.2	January 31	104.3
February 6	87.2	February 7	103.7
February 13	88.6	February 14	103.4
February 20	88.3	February 21	103.8
February 27	*90.9*	February 28	104.5

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1942	104.5	103.9	102.9	100.4	95.3	87.4	75.8
1943	87.4	*88.5*	....	....	....	....	....

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1942	80.8	82.8	90.6	86.9	80.1	90.4
1943	....	....	....	....	....	....

COMPARATIVE YEARLY SUMMARIES

	1936	1937	1938	1939	1940	1941	1942	1943
Year to Date..	76.3	89.4	65.8	78.1	87.8	87.4	104.2	*88.0*
Year Average..	80.4	79.8	71.5	83.4	85.6	97.4	90.5	...

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS †

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	60	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	*88*	..	..	..	..	..	..	..	..	..	..	..

Week ending Jan. 23, 1943—88
Week ending Jan. 30, 1943—88
Week ending Feb. 6, 1943—89
Week ending Feb. 13, 1943—87
Week ending Feb. 20, 1943—91
Week ending Feb. 27, 1943—*94*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

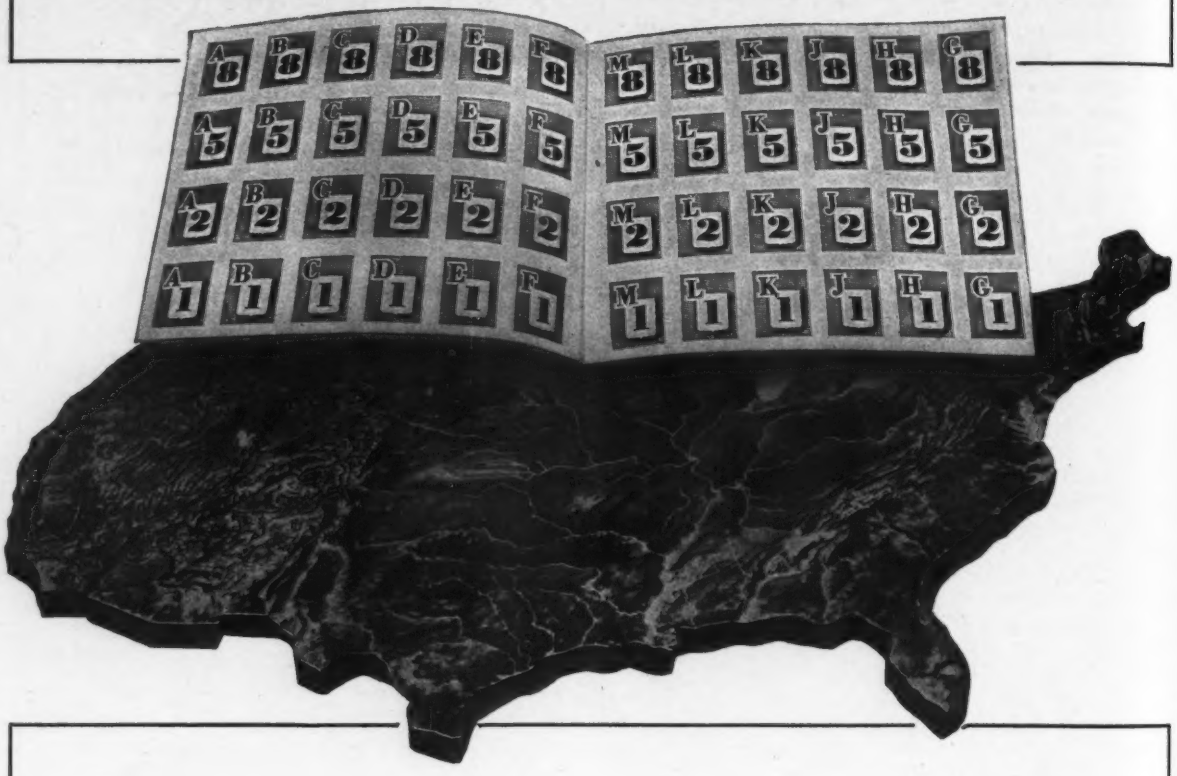
EXPORTERS
OF AMERICAN PULP

TO
BRITAIN
SOUTH AMERICA
AND ALL WORLD MARKETS

LYDDON
& COMPANY
(AMERICA) INC.

51 EAST 42ND STREET
NEW YORK CITY

Book-of-the-Year



IT IS RATION BOOK NO. 2—the book that will help to insure fair distribution of many of the nation's commodities in 1943. *Paper* made it possible.

Twenty-three paper mills produced the ninety-six carloads of paper required for the making of the 150,000,000 copies. Sixty-nine plants did the printing.

This is the largest printing job in history—the greatest single dramatic example of how the paper industry is serving a nation at war.

KENWOOD WOOL PRODUCTS

F. C. HUYCK & SONS

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Section of the
TECHNICAL ASSOCIATION
OF THE PULP & PAPER INDUSTRY

Edited by R. G. Macdonald, Secretary

Developments in the Physical Testing of Paper—1942*

By B. W. Scribner[1]

This account of developments in the physical testing of paper is one of the reports prepared annually by the chairman of the Paper Testing Committee of the Technical Association of the Pulp and Paper Industry. It does not include microscopy nor the testing of optical and printing properties as such testing is dealt with by other committees. This report covers the period November, 1941, to October, 1942, inclusive, with the exception of some articles that appeared in foreign journals of delayed delivery.

Two articles, one by Sutermeister and Osgood *(1)*, and the other by Halladay and Luey *(2)*, describe testing procedures for bonding strength with respect to resistance to splitting during printing. The Institute of Paper Chemistry studied the Thwing multiple folding endurance tester and found a modification of the basic design to be desirable *(3)*. Berger described a simple procedure for calibration of the Elmendorf tearing tester and made the recommendation that rather than using the standard tearing distance, each instrument should be calibrated and the correct tearing distance calculated for each one *(4)*. A revision of the TAPPI standard method, which employs the Elmendorf tester, was published. This form of test is termed "internal tearing resistance" as the tear is made from a slit cut in the edge of the paper *(5)*. In contradistinction, when the paper is torn through the edge, the term edge-tear is used, and an apparatus for this was described *(6)*. A TAPPI tentative standard for wax test for surface strength of paper was also published. This test is for measurement of the surface strength or its resistance to picking during printing or other operations. A series of sticks of wax having graded adhesive powers are used *(7)*. Other published new TAPPI methods are stretch *(8)*, identification of wire and felt sides *(9)*, and wet tensile strength *(10)*. Roberts discussed the relationship between tensile strength and bursting strength and described a modification of the Mullen bursting strength tester by means of which the instrument measures tensile strength. It is applicable to newsprint only *(11)*.

Interest in testing for resistance to permeation of fluids continued. Brecht and Liebert studied the writing properties of paper with respect to type of writing utensil, manner of using it, and other factors relating to wear on paper, consumption of ink, and other writing results *(12)*. Jenckel and Culemeyer studied the reaction of writing ink and paper with particular reference to tendency of some of the new sizing materials to cause the ink to form beads. They used the angle-of-contact method for measurement of the degree of sizing of the papers used *(13)*. TAPPI adopted a suggested method for using the angle-of-contact test for writing and ruling quality *(14)*. In an article by Larose, apparatus for measuring the amount of water absorbed by towels is described and results are given for commercial products *(15)*. In an article dealing with packaging problems involving water vapor resistance, Halladay briefly mentions various methods used for testing the resistance *(16)*. In testing grease resistance, Grant employs a fluorescent substance as an indicator to show when the grease has passed through the paper *(17)*. Georgi and Nolan discussed the testing for grease resistance with reference to theoretical considerations, the use of the turpentine test, and the angle-of-contact test; and described a photoelectric method which they developed for the purpose *(18)*. A TAPPI method for making the turpentine test for grease resistance was published *(19)*.

Several articles dealt with testing procedures used for testing specific products. Köhler described methods used at the Swedish State Laboratory for testing the tensile breaking strength, water absorptivity, wet tensile breaking strength, and stretch of spinning paper *(20)*. A discussion of the new requirements for testing the bursting strength of fiber container board contained in the new Rule 41 of the I.C.C. and in the Federal Specifications was given by Quinn *(21)*. Schulze described biological methods he developed for testing the resistance of fiber boards and flexible blankets to wood-destroying fungi, to molds and the tendency of giving off bad odors, to rotting caused by bacteria, and to the ravages of tropical insects *(22)*. A great variety of testing procedures used for leather substitutes were described by Herfeld and Schubert *(23)*. Weber gave the results of an investigation of testing the adhesiveness of gummed tape with the Harnden-McLaurin testing apparatus. In its present modified form, the apparatus was found to be satisfactory *(24)*.

A TAPPI method for heat test for relative stability

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 15-18, 1943.

[1] Member TAPPI, Chairman, TAPPI Paper Testing Committee; Chief of Paper Section, U. S. National Bureau of Standards, Washington, D. C.

of paper was published. It consists in finding the percentage of original folding endurance retained when paper is heated at 105° C. under prescribed conditions *(25)*. Grant discussed various methods of treating charred documents to make the writing or printing legible, and described a new method in which the charred document is impregnated with a mixture of fluorescent oil and petroleum spirit *(26)*.

Edwards gave a resumé of general developments in pulp and paper testing. One hundred literature references are included *(27)*. Scribner gave his annual report on developments in physical testing of paper *(28)* and also the annual report of the activities of the TAPPI Paper Testing Committee *(29)*.

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The Technologist in War Products Development

By John G. Strange[1]

Objectives

The thesis under which we are operating is that, of all the significant raw materials, pulp and paper are the most abundantly available. It is incumbent, therefore, upon this industry to do everything that it can do produce for winning the war and to relieve the burden which so-called "critical materials" are carrying.

Among our objectives are the following:

1. We would like to know what materials or products the industry is manufacturing for war purposes.
2. We would like to know what materials or products the industry is developing for war purposes.
3. We would like to discover, from the war agencies, what requirements they have that might conceivably be met by paper or paper products.
4. In the event that there are potential uses for paper which are not met by current production, or which are not under study, we would like to set such uses up as a research project, so that it will be possible to decide whether paper can meet the needs at hand.
5. Generally, we hope to act as a clearing house between the paper industry and the war agencies, so that the industry can become better oriented to the war program.

In August a letter was sent to the industry. In this letter the writer asked four questions. They were:

1. What is your company producing for the war?
2. What is your company developing for the war?
3. What research facilities do you have?
4. In the event that you own patents or have special skills for producing papers, and are not in a position to supply all that is needed, would you be willing to share these patents or skills with others in the industry?

Research Projects

Whenever it is desirable to study a new use for paper, we will set up projects for this purpose. In setting up a project, we will define its objectives as precisely as possible. We will outline the approach to those objectives and will enlist in the project the various branches of the industry, or agencies of the industry, which seem best qualified to make a thorough study and produce an early result. We are presently working with four such projects and have before us a number of problems which will readily lend themselves to additional projects.

Some of you may wonder how our Section relates to other official branches and agencies. You know, for example, that there is a Containers Branch of the War Production Board and of course you have heard of the Packing and Packaging Branch. There are various branches of the Army and Navy, too, which are dealing with problems of supply. A natural question, therefore, would be: Is there any conflict between the War Products Development Section and these other agencies? Will there be duplication? In our opinion, there should be no conflict, no duplication. We do not intend to cope with problems of design or conversion. These we gladly leave to other agencies. Whenever a problem relates to the properties or character of the paper itself, however, we expect to cooperate in its solution. Our purpose, therefore, is to resolve a problem insofar as it applies to paper. We hope to gather exact information as to what is required or may be required, and how much, and when. We hope to isolate the use requirements, defining them in a way that will be useful to those who are charged with development. We hope, in other words, to orient objectives so that they are clearly understood and may be approached without confusion.

Speaking of confusion, it is our impression that, while the industry has been keenly aware of the need for converting to war production, there has been an inability in many instances to discover exactly what is needed for the war. It has been difficult to separate rumors as to what is needed from actual facts as to what is needed.

One hears, for example, a great deal about vaporproofness, greaseproofness, and waterproofness. Everybody and his brother seem to be working on

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papers which will have these properties. And that is good. The issue is, however, what do we mean by vaporproofness and greaseproofness, and waterproofness? The terms are relative. What *degrees* do we have in mind and, more important, what degrees are actually required, and for what uses.

Requirements

Is there a *need* for nonmetallic materials to transport gasoline? Is paper clothing actually desired? Are the requirements for machinery-wrap met? Questions such as these and a dozen others must be answered beyond equivocation.

There can be no doubt about the fact that paper will have to perform many functions that previously have been carried by other materials. The industry might regard itself as the "shock troops" on the raw material front, or as the reserves that must rush in to cover up soft spots that are developing and that will continue to appear in an economy which is straining to supply itself and its allies with an almost fantastic quantity of weapons of all kinds.

New requirements will appear continuously, and they must be brought promptly and clearly to the attention of these reserves so they may play their part in the battle.

There is another point, and it is a difficult one to express clearly. In our eagerness to develop essential uses for paper, we may become prey to wishful thinking. We may think that we have the answer to a particular problem and be so sure of this fact that samples are supplied as being completely satisfactory for the purpose at hand.

In normal times, if such samples should prove to be unsatisfactory, it would merely be a temporary set-back for the particular company involved. Now, however, we can only think in terms of paper as a general material and, if there is wishful thinking, the unfortunate results will impinge not only upon the particular company involved but upon the entire industry and in turn upon an important war requirement.

The industry, therefore, must regard itself as a "team" and should be careful that it is not indulging in wishful thinking, since this might prejudice the opportunity for paper to serve in an important way.

In this program we shall probably use the word "substitution" quite frequently. It is important that we think of the same thing when we refer to substitution. Keeping in mind our broad objective, which is to supply materials for the war, it is manifest that we are not concerned merely with substituting one kind of paper for another, nor are we concerned with the substitution of paper for another commodity, if that commodity is doing a job effectively, economically, and in sufficient volume. Our purpose is to use or to develop uses for paper where it can do a better job, and where it can perform a function that it not adequately met by other resources.

Exhibit

Among other things, we expect to have an exhibit comprised of paper and paper products which are of interest in terms of our objectives. This exhibit will have two values: in the first place, it will bring to the attention of many people papers and paper products which are completely new to them. In the second place, and we feel this to be even more important, it will stimulate thinking along these lines. One will say: "If that particular commodity can be made of paper, why is it not possible to make *this* commodity of paper?" We hope, in other words, that the exhibit will be contagious in that it will stimulate entirely new thoughts and new ideas.

In our opinion, this program is the greatest challenge which has ever been issued to the technologists of this industry. Never before has there been such a demand upon their creative ability. Never have they had such an opportunity to serve. There is a job to be done and it must be done well.

By acting as a clearing house, and by filtering problems through your collective minds, I am sure that there will be a residue which is rich in ideas and practical results. By going at this task together, it is inevitable that there will be some extremely significant contributions and, in the end, it will be said that the pulp and paper industry has played its part well.

New TAPPI Members

The executive committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

R. Tate Alexander, chemical engineer, West Virginia Pulp and Paper Company, Covington, Va., a 1939 graduate of Virginia Polytechnic Institute.

Raymond E. Bard, coordinator of Vocational School, Champion Paper and Fibre Company, Hamilton, Ohio.

John P. Burns, sales engineer, Burns Brothers, Syracuse, N. Y., attended Syracuse University.

James W. Call, chemical engineer, West Virginia Pulp and Paper Company, Covington, Va., a 1941 graduate of North Carolina State College.

Frank W. Caplan, student, New York State College of Forestry, Syracuse, N. Y.

Brinton E. Freeman, technical assistant, Sutherland Paper Company, Kalamazoo, Mich., a 1939 graduate of the University of Michigan.

J. K. Kirkpatrick, paper mill technical chemist, Houston Division, Champion Paper & Fibre Company, Pasadena, Texas, a 1939 graduate of Purdue University.

Ralph T. Nazzaro, director of rubber laboratories, American Resinous Chemicals Corporation, Peabody, Mass., a 1936 graduate of Bowdoin College and formerly with the General Latex and Chemical Corporation, Cambridge, Mass.

Albert K. Roach, paper chemist, W. C. Ritchie & Co., 8801 S. Baltimore Ave., Chicago, Ill., a 1934 graduate of Lafayette College, and formerly with the William H. Welsh Company, Chicago, Ill., and the Mead Corporation, Kingsport, Tenn.

Fred G. Sommerville, chief chemist, Arrowhead Plant, Armstrong Cork Company, Inc., Fulton, N. Y., a 1928 graduate of Wesleyan University, Nebr.

Eugenio E. F. Vogt, managing director and partner, Fabrica Argentina de Cartones, Argentina, a 1917 graduate of Colegio Nacional, Argentina.

Robert F. Vokes, director of laboratory, Dilts Machine works, Fulton, N. Y., a 1938 graduate of the New York State College of Forestry, Syracuse, N. Y.

Papermaking by Dard Hunter

"Papermaking," by Dard Hunter, which was reviewed in the March 4 issue of the PAPER TRADE JOURNAL may be ordered from the News Print Service Bureau, 342 Madison avenue, New York. The price is $4.50 a copy.

The Nature of Fiber Staining by Iodine Stains*

By Herbert W. Rowe[1]

Abstract

The staining of fibers by iodine stains is a colloidal phenomenon, involving the adsorption of iodine from various systems upon different materials. This reaction is influenced by any condition or substance that changes the nature of the adsorbed iodine (particle size, etc.) or the nature of the adsorbent (hydration, etc.).

Ligneous materials always adsorb iodine to give a yellow color, which may be considered as an adsorption color produced by the uniform adsorption of small particles of iodine on the unhydrated lignin. This yellow color is not dichroic, nor is it affected by any of the metallic salts present in iodine-iodide stains. Water and potassium iodide are not necessary for the staining of lignin, nor do they affect the staining to any appreciable degree.

Apparently, the staining of carbohydrate materials consists of the formation of adsorption complexes of iodine, iodide, and water around the hydroxyl groups. The adsorption color varies from orange to red to violet to blue as the apparent particle size of the complex is increased. The size of these complexes may be increased by hydration and swelling of the adsorbent, or they may be decreased by heating or by the addition of a dispersing salt, such as potassium iodide. These colors are strongly dichroic.

The chief function of potassium iodide seems to be the formation of an iodine-iodide complex, whereas the function of zinc chloride, calcium chloride, and aluminum chloride is to swell the fiber and to increase the size of the iodine-iodide water adsorption complex. All these salts increase the amount of iodine adsorbed on the fiber.

The actions of all these variables appear to be additive. Fibers containing lignin and cellulose give colors which are due to both components, and stains containing several of the salts give staining reactions which may be considered as an average of the individual reactions of their components.

For more than a century, the microscopic investigation of cellulosic materials has been facilitated by the use of iodine stains. Despite the large amount of patient work done to improve the quality of iodine stains, very few attempts have been made to study the fundamental principles underlying the staining reactions and to formulate a comprehensive explanation of these phenomena. It was felt, therefore, that an investigation of iodine stains, especially in their application to papermaking fibers, would be of definite value.

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Statler, Boston, Mass., Sept. 29-Oct. 1, 1942.

A portion of a thesis submitted in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Doctor of Philosophy from Lawrence College, Appleton, Wis., 1940. This work was carried out under the direction of B. L. Browning and John H. Graff.

[1] Member, TAPPI; formerly with Nekoosa Edwards Paper Co., Port Edwards, Wis.

Historical Review

As early as 1830, Gmelin *(1)* stated that an iodine-iodide-sulphuric acid solution stained cellulose a blue color. In 1855, Radlkofer *(2)* reported experiments with a zinc chloriodide stain. Herzberg *(3)* in 1889 made the statement that fibers could not be separated as to origin by any of the color reactions which had been proposed up to that time.

In 1912, Clark *(4)* recommended the zinc chloride-iodine-iodide stain as a useful reagent for fiber analysis, and mentioned that the addition of a small crystal of zinc chloride would intensify the blue color of the stain with chemical wood fibers. In 1921, Wisbar *(5)* stated that an aluminum chloriodide stain was suitable for distinguishing straw from chemical wood pulp. Two years later, Lee *(6)* wrote that the use of zinc chloride in iodine-iodide stains increased the intensity of blue shades, that the use of calcium chloride or magnesium chloride intensified the red shades, and that iodine made all colors darker and somewhat bluer. Graff *(7)* tried over 600 combinations before he arrived at his C stain.

According to Schwalbe *(8)*, the characteristics which may be employed to differentiate fibers depend upon: *(a)* the amount of encrusting or ligneous material, and *(b)* changes in chemical composition brought about by the different digestion processes. Bixler *(9)* carried out an investigation along this line when he pulped 20-μ cross sections of sprucewood by the sulphite, kraft, and soda processes, and observed the colors obtained when these cross sections were subsequently treated with C stain. He concluded that the color observed with pulp fibers is a composite of the different colors produced on the various units of its structure.

Staining has been variously attributed to reactions of a physical, chemical, or colloidal nature. In physical staining, the material imparting the color (e. g., iodine) is merely deposited within the fiber in different particle sizes or in different amounts according to a solution equilibrium. The chemical theory is based upon the assumption that the iodine undergoes a chemical reaction with the fiber or some of its components. According to the colloidal theories of staining, the colors obtained are due to iodine adsorbed in different amounts and in different particle sizes.

Bailey *(10)* has succeeded in inducing crystals of iodine to form within the walls of cotton hair. These crystals originated within the interstices of the cellulose matrix and were parallel to the long axis of the fibrils. Evidently, this is a physical type of staining reaction.

Most of the theories advanced for fiber staining have been based on the behavior with dyes, but some of this work is of interest in an investigation of iodine stains. Czaja *(11)* separated substantive dyes into different particle sizes with the ultrafilter and obtained filtrates that varied from blue to yellow with a decrease in filter pore size. Using these solutions to

stain plant tissues, he was able to correlate staining differences with the particle size of the dye held on the tissue. He concluded that plant tissues could be regarded as ultrafilters and that differential staining with substantive dyes was a purely physical reaction. Schwarz *(12)* also believed that staining differentiations are largely a matter of particle size. He stated that, with substantive dyes, the largest particles are found with the cellulose, medium sized particles with the lignin, and the smallest particles with the cutin.

Chemical theories for the staining of fibers by iodine have been based upon the reducing action of aldehydic groups in lignocelluloses. Huebner and Sinha *(13)* found that impure celluloses absorbed more iodine than the purer celluloses, giving a color dependent upon the purity, and evolving different amounts of iodoform upon distillation. Cross and Bevan *(14)* noted a similar reducing power in the case of jute fibers; they found that an aqueous solution of ferric chloride and ferric ferricyanide reacted with lignocelluloses, especially jute, to give a heavy precipitate of Prussian blue within the fiber.

More recently, staining reactions have been interpreted in terms of colloidal chemistry. In 1924 Tingle *(15)* noticed that fibers which stained yellow with zinc chloriodide stain were stained blue when fresh stain was applied to the stained fibers after about 30 minutes, and that this process was reversible when the iodine was washed off the fibers with distilled water. He concluded that the stain changed the hydration of the lignocellulose, enabling it to absorb more iodine and producing a blue color.

Ostwald *(16)* studied the relationship between color and degree of dispersion for a large number of elements, including iodine. He found that gold sols and alkali-metal sols change from blue to violet to red to orange to yellow with increasing dispersion. Similarly, with increasing dispersion, iodine particles in an aqueous medium varied from blue to violet brown to red brown to yellow brown to yellow.

The color changes of iodine-starch preparations have been noticed in many forms. The observations made by C. and W. Nägeli and confirmed by O. Bütschli *(17)*, concerning the action of alcohol on the blue-colored starch bodies, are quite interesting. Before the definitive loss of iodine, which dissolves in alcohol in a molecular dispersion, the blue particles of potato starch became violet, then red, orange, and finally yellow. Harrison *(18)* found that successive additions of water to this yellow solution produced exactly the reverse series of color changes. His explanation of the action of the alcohol was that, on the one hand, it precipitated the starch from solution, thereby prohibiting its protective action, and, on the other, it gradually dissolved the colloidally dispersed iodine to give molecularly dispersed iodine. Therefore, increasing degrees of dispersion gave the color series from blue to yellow. Harrison obtained the same color changes by warming aqueous solutions of starch and iodine. Likewise, he found that the addition of increasing amounts of potassium iodide brought about a color change of a blue starch-iodine solution toward the yellow. According to Harrison, the action of potassium iodide was similar to that of heating, in that both dispersed the iodine, but the action of the iodide was more accurately classified as a peptization phenomenon. Finally, Harrison found that the addition of salts, except those which increase the solubility of molecularly dispersed iodine, colored yellow and orange starch-iodine sols more red, stained red and violet solutions more blue, and made blue solutions a deeper blue or gray. The action of all these electrolytes (including acids) generally consisted, according to Harrison, in a lowering of the solubility of iodine or in a tendency to lessen its degree of dispersion.

Huebner *(19)* noted similar color changes for cellulose stained with iodine. With mercerized and unmercerized cotton fibers stained with iodine-iodide stains containing various amounts of zinc chloride, increasing concentrations of zinc chloride changed the staining colors from tinted yellow, through light and dark brown, to blue and blue green. With all the stains, the mercerized cotton gave darker colors than unmercerized cotton and, with stains containing large amounts of zinc chloride, the mercerized material was more blue than the unmercerized. The blue coloration was not observed when the stain was hot but it appeared as soon as it cooled. Huebner also stained mercerized and unmercerized cotton with aluminum chloriodide solutions of increasing aluminum chloride concentration. He found that the color of mercerized cotton gradually changed from a green gray (with the weakest solution) to a more and more reddish gray and then gradually to a bluish chocolate. The reaction, on the whole, proceeded more slowly than the zinc chloriodide reaction. For ordinary cotton, the color was a brown which increased in depth but did not change appreciably in hue.

Freundlich *(20)* stated that many organic compounds and a few inorganic compounds absorb iodine to give a blue color. All the materials studied absorbed iodine strongly when they were in an amorphous or extremely fine crystalline state.

Frey *(21)* has made the most recent and most definite attempt to explain the differential staining of fibers by iodine stains. His explanation involves a combination of chemical and colloidal mechanism. Frey stained fibers with a zinc chloriodide stain and investigated them in linearly polarized light over a Nicol prism mounted beneath the objective in the optical path of the microscope. If the fiber axis of the stained fiber is parallel to the plane of vibration of the Nicol, the fibers appear deep black; if perpendicular to it, they appear colorless—i. e., they are dichroic. The yellow reaction colors of lignin, suberin, and cutin are, in contrast to the cellulose reaction, not dichroic; they show no differences in intensity when one rotates the object stage over the polarizer. It must be emphasized that dichroism in the case of a yellow zinc chloriodide reaction is absent only in fresh preparations. If the section is left in the reagent for some time, the yellow stained membranes also become partly dichroic. According to Frey, this is due to the fact that the zinc chloride gradually "liberates" the cellulose from the incrustants and permits its characteristic reaction to overshadow the lignin reaction, which is still present and may be seen in the "colorless" position.

Frey believed that the iodine staining of cellulose exhibits both a dichroism caused by the particles of iodine (rod dichroism) and a dichroism caused by the directed adsorption of iodine on the cellulose micelles (specific dichroism). The specific dichroism of iodine on fibers is quite strong. In one experiment, the iodine layers within the fiber were only 0.5μ thick and, in spite of the fact that the path of light through the crystals was only one wavelength, they competely

absorbed all the light in one direction and transmitted the light in the direction perpendicular to this.

Thus, according to Frey, in the reaction of zinc chloriodide on cellulose, there is first an equilibrium set up between the solution and the fiber, during which time the color is dark red brown and shows the dichroism dark brown-dirty red; this dichroism is a type of rod dichroism and is due to the very strongly anisotropic particles of iodine. Then there is the directed adsorption of iodine on the cellulose, which gives rise to a clearer color on the fiber and the dichroism black-colorless; this dichroism is a combination of rod and specific dichroism. If the fibers are lignified, suberized, or cutinized, they stain, according to the degree of incrusting, a directly visible yellow to yellow brown, or the incipient reaction can be detected beneath the darker iodine stain of cellulose in the "colorless" position of cellulose dichroism. This yellow staining is not dichroic. It can be thought of as a solid solution of iodine in lignin, suberin, or cutin, or it can be explained on the basis of the chemical theory of staining as a chemical combination of these materials with iodine. The other visible colors, such as the dark brown colors, might be considered as being only mixed colors of the cellulose reaction with one of the yellow iodine reactions. Zinc chloride probably plays an important part by opening up the fiber to different degrees and permitting more of the cellulose to be stained.

Staining Technique and Color Notation

The staining of papermaking fibers with iodine stains involves many variables. The stains contain iodine, which may behave quite differently under different conditions, and various salts, each of which has an effect on the fiber, on the iodine, or on both. Moreover, the material being stained is a natural product, subject to wide variations in composition as a result of its source and the treatments involved in the process of separation during manufacturing operations. The first logical approach to the study of such staining reactions seemed to be the separation of the stain into its components and the use of these simpler stains for the staining of a variety of fibers and the materials which may be present in these fibers. Because the greatest number of differentiations in color is obtained with the C stain, this stain was chosen for study. The C stain, developed by Graff *(22)*, is made from the following standard solutions:

Standard iodine solution. To 50 ml. of distilled water, add 0.9 gram of potassium iodide and 0.65 gram of iodine.

Zinc chloride solution. Add about 100 ml. of distilled water to 200 grams of zinc chloride (C.P. crystals or fused sticks), and dilute to a specific gravity of 1.80 at 28° C.

Calcium chloride solution. Add about 100 grams of C.P. calcium chloride to 150 ml. of distilled water and adjust to a specific gravity of 1.36 at 28° C.

Aluminum chloride solution. Add 40 grams of aluminum chloride ($AlCl_3 \cdot 6H_2O$) to 100 ml. of distilled water and adjust to a specific gravity of 1.15 at 28° C.

To obtain an idea of the effect of the various salts in the C stain, the following stains were prepared:

I. C stain:
20 ml. of the aluminum chloride solution
10 ml. of the calcium chloride solution
10 ml. of the zinc chloride solution
12.5 ml. of iodine-iodide solution

II. KI-I:
30 ml. of the iodine-iodide solution

III. $AlCl_3$:
20 ml. of the aluminum chloride solution
12.5 ml. of the iodine-iodide solution

IV. $CaCl_2$:
10 ml. of the calcium chloride solution
12.5 ml. of the iodine-iodide solution

V. $ZnCl_2$:
10 ml. of the zinc chloride solution
12.5 ml. of the iodine-iodide solution

VI. Herzberg stain:
40 ml. of the zinc chloride solution
12.5 ml. of an iodine solution containing 5.25 grams of potassium iodide and 0.25 gram of iodine.

The component solutions of the stains were carefully mixed in the order given and were allowed to stand for at least 12 hours before being used. They were stored in dark staining bottles, a crystal of iodine being added to each.

The material to be studied was disintegrated by agitation in distilled water and was placed on a slide. The slides were allowed to dry slowly on a hot plate. A few drops of the stain were placed on the material; after about one minute, a cover glass was placed on top and the excess stain was allowed to drain off. The stained slide was then studied under the microscope (16 mm. objective and 12.5× eyepiece) and, for the purpose of permanent record, the color was compared with one of the 1115 colors painted in Ridgway's "Color Standards and Nomenclature" *(23)* and noted according to his nomenclature.

The dichroism of each staining color was also studied by the use of a rotatable Nicol (the analyser) placed over the eyepiece on top of the microscope drawtube. With the object in focus, the Nicol was rotated until the light was transmitted with minimum intensity and the color was noted for this position; the Nicol was then rotated through 90° and the color was again noted. From the differences in these two colors, the degree of dichroism could be estimated. The dichroism was classified as "strong," "fair," "slight," etc.

At first the light used for illumination was daylight from the northern sky. Later it was found that light from a fluorescent daylight lamp gave the same colors as those obtained with good daylight and was much more constant than the light from a winter sky.

The materials stained may be classified as (1) cellulose and cellulose derivatives, (2) lignin and lignin derivatives, and (3) wood pulps.

Staining of Methylated and Acetylated Cellulose

Methylated cotton linters of four different methoxyl values (20-35% methoxyl) and acetylated cotton celluloses of three different acetyl contents (8.7, 57, and 61.1%) were stained with Stains I-V and studied for color and dichroism. The data for the acetylated celluloses are given in Table I. In this table the words in parentheses represent the arbitrary classification of dichroism of the color immediately above.

Acetylation effects a change in the color of cellulose stained with iodine stains from the red oranges and the orange reds to the yellow oranges and finally orange yellows. Similar results were obtained in the stainings on methylated cellulose. This change is easily followed visually; with respect to hue alone, it amounts to a change from about 620 mμ to about 580 mμ.

Since neither methylation nor acetylation was com-

plete, the field always presented some fibers which were more yellow than others. Some fibers were yellow on the surface and violet around the lumen, indicating methylation or acetylation of only the surface of these fibers. Other fibers had definite segments of methylated (or acetylated) cellulose and unmethylated cellulose. However, all predominant colors were noted and an attempt was made to determine which color was in the majority.

The stains containing zinc chloride swelled the partially methylated fibers much more than did those containing other salts or no salts at all. In the case of methycellulose containing 21% methoxyl, the fibers separated into concentric tubes when stained with Stains I and V. Often the violet inner tube surrounding the lumen of the fiber had swollen so much that it had burst the yellow outer tube. This was probably because the unmethylated cellulose was swollen by zinc chloride, whereas the methylated cellulose was not swollen and could not withstand the pressure from within.

When one of the samples of acetylated cellulose was deacetylated, its staining characteristics became practically the same as those of cotton cellulose. The stained methylated and acetylated celluloses were, in general, much less dichroic than stained cotton cellulose. The deacetylated sample showed the same dichroism as stained cotton cellulose.

Methylated wood pulps of four different methoxyl contents also were stained and studied. The trend of color change upon methylation was from the violets of bleached pulps to the orange yellows. Concurrent with this trend was the decrease and disappearance of dichroism.

Those materials (lignin, suberin, etc.) which always stain yellow with iodine do not have readily available hydroxyl groups, whereas those which stain blue with iodine (starch, swollen cellulose, hydrous oxides, etc.) have an abundance of such groups. Therefore, it was concluded that the covering of the hydroxyl groups of cellulose (through methylation or acetylation) caused it to stain a yellow color with iodine stains. The iodine must be held on the fiber in some fashion quite different from the way it is held on ordinary cellulose, because it shows practically no dichroism, whereas most of the stainings on cellulose show fairly strong dichroism. Because the adsorption of iodine on cellulose appears to be linked with the presence of hydroxyl groups, we may assume that these hydroxyls have some sort of force field which attracts water and iodine to them, resulting in a concentration of iodine adsorbed in a definite pattern on the micelles. Such an adsorption would lead to a much greater anisotropy than the uniform adsorption of iodine over the surface of acetylated or methylated cellulose, and would give a much stronger dichroism. Thus, both cellulose and its derivatives would have a weak rod dichroism, but only cellulose would have a strong specific dichroism. The concentration of iodine around the hydroxyl groups would result in a greater apparent particle size for the iodine, giving red and blue staining colors, whereas the uniform distribution of iodine over the surface of methylated or acetylated cellulose would result in a smaller apparent particle size, with molecular dispersion as the limiting case, giving a yellow staining color. The most apparent function of the salts seemed to be the swelling of the unmethylated or unacetylated portions of the cellulose fibers. It is also possible that the hydrated chlorides carry water into the force field of the hydroxyl groups and help to attract more iodine; this would result in the formation of larger particles and a color change toward the blue. Neither the presence of the salts nor the swelling changed the staining reaction of methylated or acetylated cellulose.

Staining of Cellulosic Materials

The following cellulosic materials were stained with all six stains: spruce Cross and Bevan cellulose, spruce alkali-resistant cellulose, spruce hemicellulose, spruce holocellulose, nitric acid oxycellulose, chromic acid oxycellulose, and spruce groundwood.

It was found that the staining colors were somewhat similar for the stains which did not contain zinc chloride, being mostly in the yellow-orange region; apparently these stains did not swell the fibers appreciably. However, spruce hemicellulose and all materials containing appreciable amounts of available hemicelluloses stained in the blue and violet region with stains containing zinc chloride and were strongly dichroic, indicating a directed adsorption of iodine. It may be concluded that zinc chloride hydrates hemicellulose, as well as cellulose, resulting in larger iodine adsorption complexes and a change of color from yellow orange to blue and gray.

These observations on the effect of hemicellulose on the staining reaction lead to the further postulation that the blue colors obtained when bleached wood pulps are stained with C stain may be due to the presence of hemicellulose, whereas the red colors obtained with C stain on alpha pulps may be due to the removal of the hemicelluloses by the alkaline treatment given these pulps, resulting in a material which behaves like cotton cellulose.

No violet colors were found for chromic acid oxycellulose. Apparently, the oxidized cellulose no longer offered sufficient hydroxyl groups for the attraction of water and iodine to form the large adsorption com-

TABLE I.—CHANGE IN STAINING REACTION OF COTTON CELLUOSE ON ACETYLATION

Material Stained	No. 1 C Stain	No. 2 KI-I	No. 3 AlCl₃	No. 4 CaCl₂	No. 5 ZnCl₂
Cellulose (cotton)	Red-orange (strong)	Orange red-orange (slight) Orange (slight)	Orange red-orange (fair) Red-orange (fair)	Red-orange (strong)	Orange-red (strong)
Acetylated cellulose 8.7% Ac	Yellow-orange (slight)	Orange red-orange (strong)	Orange yellow-orange (strong)	Red-orange (slight)	Orange (fair)
Acetylated cellulose 57% Ac	Yellow (none) Yellow-orange (slight)	Yellow orange-yellow (none) Orange red-orange (v. slight)	Yellow (none) Orange-yellow (fair)	Orange-yellow yellow (none) Orange red-orange (slight)	Yellow (none) Yellow-orange (slight)
Acetylated cellulose 61.1% Ac	Yellow (none)	Yellow orange-yellow (none) Orange yellow-orange (slight)	Yellow (none)	Orange-yellow yellow (none) Yellow-orange (v. slight)	Orange-yellow yellow (none) Yellow-orange (slight)
Deacetylated cellulose from 8.7% Ac	Orange orange-red (strong)	Orange (slight)	Orange red-orange (fair)	Orange orange-red (strong)	Red (strong)

plexes necessary for a violet staining color. Only a trace of violet color was found for spruce groundwood. Perhaps that portion of the lignin which is combined with cellulose in groundwood prevented the swelling action of zinc chloride on the cellulose, with the result that most of the groundwood stainings were yellow. A few sections of undigested sprucewood were stained with Stains I-V. Again, all the colors observed were characteristic of a ligneous material.

It was also found that groundwood which had been exposed to ultraviolet light in the Fade-Ometer or to direct sunlight gave staining reactions quite similar to those of unbleached sulphite pulp. This was in agreement with the data of Graff *(24)*, which indicated that exposure to ultraviolet light so modified the lignin that it could be partially removed by water or dilute caustic, both of which are used in the preparation of slides for staining.

Staining of Ligneous Materials

Spruce sulphuric acid lignin, lignosulphonic acid, calcium lignosulphonate, phenol lignosulphonic acid, and thioglycolic lignosulphonic acid were stained with Stains I-VI and studied for color and dichroism. None of the stainings showed any dichroism. It was found that the colors obtained were all confined to a narrow range between orange and orange yellow. Spruce groundwood stained similarly, but was at the yellow limit of the group of ligneous materials. The various salts had little effect on the stainings of these ligneous materials.

Considering these observations and the literature, the staining of ligneous materials may be pictured as the adsorption of many small particles of iodine on the unhydrated surface of the material. Because these materials do not have many available hydroxyl groups, as compared with cellulose, they do not lend themselves to swelling and the adsorption of water. Consequently, no large adsorption complexes of iodine can be built up, and the various salts have little effect on the staining colors. With particles of iodine distributed uniformly over the surfaces of the amorphous lignin, there can be no anisotropy and no dichroism.

Because spruce lignin and the sulphonic acid lignin derivatives had essentially the same staining reactions with iodine, it may be concluded that the effect of lignin on the staining reactions of unbleached sulphite pulp fibers will not be influenced by the state of the lignin or the degree of its conversion to the sulphonic acid derivatives.

Effect of Pretreatment of Fibers with Salt Solutions Before Staining

In an attempt to ascertain whether the action of the various salts used in iodine stains are due to simultaneous action with the iodine or to independent effects, fibers were treated with these salts and stained with an iodine-iodide solution. The salt solutions were the standard solutions of zinc chloride, aluminum chloride, and calcium chloride.

Using concentrations of salts proportional to their concentration in the C stain, allowing the salt to remain in contact with the fiber only a few minutes, and staining immediately with a proportionate amount of iodine-iodide solution (Stain II) gave stainings on cotton fibers which were not significantly different from those obtained with stains containing iodine-iodide and salts in admixture.

When fibers were allowed to stand in the concentrated salt solutions for eight hours, it was found that those kept in zinc chloride were quite swollen and had a tendency to be peptized upon agitation, whereas the fibers in either aluminum chloride or calcium chloride were not noticeably affected. After draining and blotting, these fibers were stained with an iodine-iodide solution of one-half the concentration of Stain II. It was found that pretreatment with aluminum chloride or calcium chloride had little effect on the staining reactions of cotton cellulose, whereas pretreatment with zinc chloride caused the fibers to stain mostly black, indicating the adsorption of too much iodine for color distinction. When these black fibers were flooded with water, a bright Tyrian blue appeared. The blue fibers became colorless only after immersion in water for four hours. All the stained fibers which had been pretreated with zinc chloride were strongly dichroic.

It is evident that cellulosic fibers swollen by zinc chloride are highly receptive to the adsorption of iodine. Washing with water removes some of the excess iodine and causes a bright blue staining color to appear on the swollen fiber. In view of the evidence obtained in preceding experiments, this blue color must be due to an adsorption complex of iodine and water on the swollen fibers. As pointed out before, this type of adsorption leads to a strong specific dichroism. Thus, the water used for flooding these stainings would seem to serve the dual purpose of removing excess iodine and promoting hydration of the swollen fibers.

Cotton cellulose was also swollen with 14% sodium hydroxide, after which it was neutralized with hydrochloric acid and stained with the six iodine stains. All stainings on the swollen cotton gave a predominance of the black shade, which turned to Tyrian blue when flooded with water. Since cotton swollen by sodium hydroxide gave the same staining reaction as cellulose swollen by zinc chloride, it may be concluded that the formation of the blue adsorption complex is characteristic of swollen cellulose and not of the manner in which it is swollen. Similar results were obtained on chemical wood pulps which had been swollen by sodium hydroxide, indicating that swollen wood cellulose also gives a blue adsorption complex with water and iodine-iodide.

An alcoholic solution of iodine, containing an amount of iodine comparable to that in Stain II, did not stain the swollen cotton cellulose until a few drops of an aqueous solution of potassium iodide were added to the slide; then it gave staining reactions similar to those obtained with Stain II. In comparison, it was also found that this alcoholic iodine did not stain unswollen cotton cellulose, but the usual staining color was obtained when aqueous potassium iodide was added to the slide; furthermore, the addition of a drop of concentrated zinc chloride solution caused the formation of the characteristic Tyrian blue.

Thus, neither cotton cellulose nor swollen cellulose is stained appreciably by iodine but both are stained by the iodine-iodide complex. Because all iodine stains used today contain iodide as well as iodine, it has become customary in the literature to speak of "staining with iodine"; however, the correct expression is "staining with iodine-iodide."

Although swollen cotton cellulose can be stained with an iodine-iodide solution and flooded with water to give Tyrian blue, it may also be of interest to note that flooding with an aqueous solution of potassium iodide resulted in colorless fibers. Flooding with al-

cohol or ether gave dull yellow fibers. Apparently the potassium iodide solution removed all the iodine from the fibers, and the organic solutions did not have the ability to form the blue adsorption complex on cellulose with iodine-iodide, because they did not contribute to the formation of a hydrated iodine complex. This particular blue color is probably the result of the particle size of the agglomerate of iodine-iodide and water on the fiber, according to the theories of Ostwald *(16)* and Harrison *(18)*; there must be a directed adsorption of iodine on the swollen cellulose, according to the postulations of Frey *(21)*, in order to produce the strong dichroism characteristic of this color.

Effect of Salts on Staining Reactions of Starch, Cellulose, and Related Materials

Following the work of Ostwald and Harrison on the relationship between color and particle size of materials stained with iodine, several carbohydrate and ligneous materials were stained with iodine and then treated with various salts. The materials thus studied were: arrowroot starch, dextrin, waxy maize cornstarch, bleached soda pulp, cotton cellulose, hemicellulose, holocellulose, methylated cotton cellulose, acetylated cotton cellulose, spruce groundwood, and lignosulphonic acid. In order to distinguish between the action of iodine and of potassium iodide, a saturated solution of iodine in hot distilled water was prepared and allowed to cool. The clear supernatant liquid was designated "aqueous iodine." Although it has been claimed, with some justification, that it is impossible to prepare a solution of iodine in water without having iodide ions present as a result of hydrolysis, this solution may be considered as having a minimum iodide concentration under the experimental conditions prevailing in this investigation.

The most common procedure was to stain some of the material on a watch glass or in a test tube with a few drops of the aqueous iodine, note the color, slowly add a solution of one of the salts (potassium iodide, zinc chloride, aluminum chloride, or calcium chloride), and note any change in color. The potassium iodide solution was a saturated solution of the salt in water; the solutions of the other salts were the standard solutions employed in making up the stains used heretofore in the investigation. However, it was soon realized that the color changes observed upon the addition of the salt solutions might be due, partially, to the dilution of the staining; consequently, many of the stainings were treated with the solid salts.

It was found that aqueous iodine stained carbohydrate materials as follows: arrowroot starch, deep violet; dextrin, deep red blue; waxy maize cornstarch, red brown; bleached soda pulp, faint orange; cotton cellulose, very faint yellow. Thus, with the carbohydrate materials, there was a change from blue toward red and yellow and a concurrent decrease in the intensity of the color, corresponding to the change to more strongly oriented structures and to the decrease in surface-active hydroxyl groups. It was also found that the lignin-containing materials, which are amorphous, stained a definite yellow. Methylated and acetylated cellulose behaved like ligneous materials with respect to their staining reactions. Both iodine vapors and alcoholic iodine stained arrowroot starch a yellow color, which became blue violet upon the addition of a drop of water.

Again, it appears that iodine forms a large adsorption complex around the readily available hydroxyl groups, giving a color varying from orange to blue, depending upon the ease of hydration of the adsorbent and the apparent particle size of the adsorption complex. Materials which do not have available hydroxyl groups may adsorb smaller particles of iodine to give a yellow color, because of the fact that they do not attract water to build up the large adsorption complexes.

It was found that a small amount of potassium iodide increased the intensity of an iodine staining, whereas larger amounts had a tendency to effect a change from blue through violet and red to orange and yellow for all materials which originally stained in the blues or reds with iodine, and to have little or no effect on the color of materials which already were stained yellow. Thus, potassium iodide changed the color of arrowroot starch stained with iodine from a deep violet through purple and wine color to a light brown, indicating that potassium iodide exerts a dispersing action upon large agglomerates of iodine. How far this color change will proceed depends upon the nature of the adsorbent and its power to hold large complexes of iodine.

The addition of zinc chloride to iodine stainings caused a change of color toward the blue for carbohydrate materials. Cotton cellulose changed from brown to red brown to dark violet, and waxy maize starch changed from red brown to green blue to colorless. Zinc chloride had little effect on the color of arrowroot starch, which was already in the blues, or upon lignin materials. These observations are in accord with the theories of Ostwald *(16)* and Harrison *(18)* concerning the increasing particle size of starch-iodine complexes with the addition of certain salts (those which do not peptize iodine), and the subsequent or corresponding change of color from yellow through red to blue and finally gray. It may be that zinc chloride increases the size of these adsorption complexes of iodine by carrying water into them.

Aluminum chloride had no appreciable effect on the hue of any of the colors obtained with the iodine stain, although it did intensify several of the stainings. Calcium chloride had about the same effect as zinc chloride, but not quite to such an extent.

It was found that the addition of potassium iodide made the aqueous iodine solution more yellow, perhaps because of a dispersing action on the colloidally dissolved iodine or the formation of the potassium triiodide complex; the other salts had little effect on the color of aqueous iodine. The effects of the salts (observed in the preceding work) on the staining colors of the various materials must have been due to their action on the system, iodine plus adsorbent, and not merely to their action on the iodine stain.

Measurement of the Adsorption of Iodine by Fibers

Qualitative observations of the relationships between the amount and nature of the adsorbed iodine, as well as the nature of the adsorbing surface, have been described in the preceding sections. One important factor concerns the amount of iodine adsorbed by various fibrous materials and the effect of certain salts upon this adsorption. The experiments described below represent a quantitative study of iodine adsorption in the presence of the salts commonly used in stains.

A definition of terms used follows:

The procedure of adding a known amount of iodine to fibers, allowing the mixture to stand a definite length of time, pipetting off an aliquot portion, and titrating this aliquot gives, by difference, the *total iodine* removed from the solution, but does not distinguish between the amount adsorbed and the amount combined.

In addition to the titration of an aliquot portion as before, the remainder (including the fibers) was also titrated. The sum of these two titrations, subtracted from the amount of iodine originally added, gives the iodine not recovered. This represents the iodine which has reacted with the pulp or has been adsorbed so strongly that it appears to have reacted with the fibers, and it was therefore called the *combined iodine.*

The difference between the total iodine on the fibers and the combined iodine was taken to be the *adsorbed iodine.*

The fibrous materials studied were: purified cotton linters, unbleached and bleached spruce sulphite pulp (from the same cook), unbleached and bleached southern pine kraft (from the same cook), unbleached and bleached paper birch soda pulp (from the same cook), bleached spruce kraft pulp, and groundwood. All pulps were disintegrated in the Gösta Hall disintegrator. The amount of material used for each determination consisted on an amount of air-dry pulp equivalent to one gram of moisture-free material. These materials were treated with 50 ml. of iodine-iodide solutions of known composition for exactly five minutes; at the end of that time titrations were made with a standard sodium thiosulphate solution, using a few drops of starch-iodide as an indicator.

In the first series of experiments, the effect of potassium iodide was studied. An iodine solution of the concentration present in the C stain (0.155 gram per 50 ml.) was used, and various amounts of potassium iodide were added to make up a series of solutions containing the same amount of iodine but different amounts of potassium iodide. Figure 1 illustrates the typical results obtained.

The effects of zinc chloride, calcium chloride, and aluminum chloride were determined with solutions of iodine, using the same concentration as before (0.155 gram per 50 ml.) and a potassium iodide concentration equal to the minimum value which gave nearly constant adsorption of iodine in the first series of experiments (3.0 grams per 50 ml.). The curves shown in Figs. 2, 3, 4, and 5 are typical of the data obtained.

In general, more iodine was adsorbed by unbleached than by bleached or purified fibers; groundwood adsorbed more iodine than did the other pulps. This was due, probably, to the larger specific surface of the amorphous lignin.

As a rule, alkaline pulps, both bleached and unbleached, adsorbed more iodine than did corresponding sulphite pulps. This is in accord with observations that alkaline pulps give more intense colors when stained with C stain than do the sulphite pulps. Soda pulps, in particular, adsorbed considerable iodine, perhaps because they were prepared from a hardwood and offered a much greater specific area to the iodine.

Compared with the other salts, potassium iodide had little effect on the adsorption of iodine. The adsorption from stains containing aluminum chloride was less than that from those containing zinc or calcium chloride, but the curves for aluminum chloride followed the same trend as those for the other two salts. The effect of calcium chloride was similar to the effect of zinc chloride, except for the fact that the amount of combined iodine was fairly low and did not change much with concentration of calcium chloride, whereas it was higher for zinc chloride; with the latter, the combined iodine rose sharply and then leveled off with increasing zinc chloride concentration. Both zinc and calcium chloride showed a region of maximum adsorption, which may have been due to a concentration of salt conducive to maximum swelling. However, in this swelling process the zinc chloride must have affected the fiber in such a way that more iodine was combined than in the swelling with calcium chloride. It may be that the zinc chloride hydrolyzed part of the cellulose, resulting in the formation of more reducing groups and the reaction of iodine with these groups.

The amount of combined iodine seemed to have no

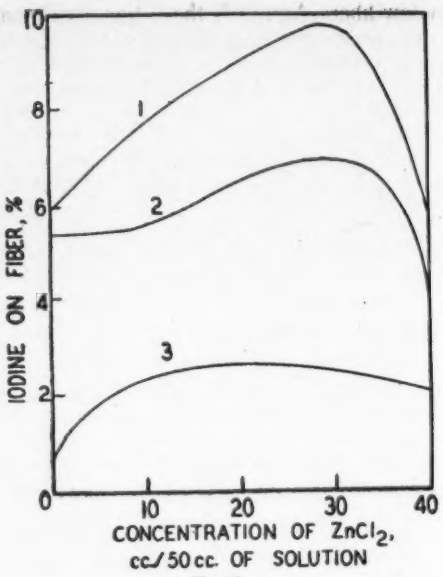

FIG. 2

Effect of Zinc Chloride on Adsorption of Iodine by Groundwood. 1. Total; 2. Adsorbed; 3. Combined.

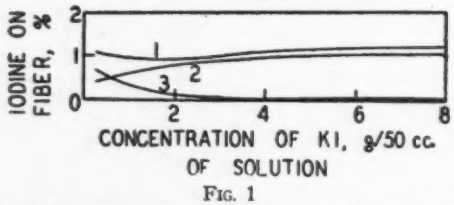

FIG. 1

Effect of Potassium Iodide on Adsorption of Iodine by Bleached Sulphite Pulp. 1. Total; 2. Adsorbed; 3. Combined.

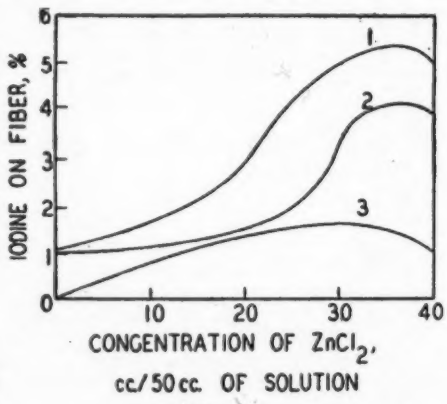

FIG. 3

Effect of Zinc Chloride on Adsorption of Iodine by Bleached Sulphite Pulp. 1. Total; 2. Adsorbed; 3. Combined.

effect on the staining color, indicating that this iodine oxidized reducing groups and did not form a colored compound with either the cellulose or the lignin.

The increase in the amount of iodine adsorbed may be related to the change toward larger adsorption complexes and a color more toward the reds and the blues, because aluminum and calcium chlorides have been found to cause a change of staining color toward the red and zinc chloride has been found to cause a further change toward the blue. However, the amount of iodine adsorbed from stains containing calcium chloride was found to be as large or larger than the amount adsorbed from stains containing zinc chloride; moreover, zinc chloride stains give colors which are definitely more blue than those obtained with calcium chloride stains on cellulose. The formation of larger adsorption complexes on the surface of the fiber when zinc chloride is used than when calcium chloride is employed, because zinc chloride may carry more water into the vicinity of the hydroxyl groups, may be the cause of increased apparent particle size and the blue color. In addition to the change of hue caused by these chlorides, there was a perceptible change of intensity of the staining in the presence of these salts, which caused an increase in the amount of iodine adsorbed on the fiber.

Discussion

The literature has indicated that the staining of fibers by iodine stains is a colloidal phenomenon, involving the adsorption of iodine from various systems upon the surfaces of different materials. Hence, the staining reaction is influenced by any substance which changes the nature of the adsorbed iodine (particle size, etc.) or the nature of the adsorbent (hydration, etc.).

Significant differences were observed in the iodine-staining reactions of lignin and carbohydrate materials.

Ligneous materials always adsorb iodine to give a yellow color. This yellow color is not dichroic, nor is it affected by any of the salts present in the C stain (potassium iodide, aluminum chloride, calcium chloride, and zinc chloride). It may be considered as an adsorption color produced by the uniform adsorption of small particles of iodine on the unhydrated surface of the lignin. Since this adsorption is random, there is no decided anisotropy and no apparent dichroism. Because of the large specific surface of lignin, it adsorbs more iodine than cellulose, and will predominate in the staining reaction if it is present in sufficiently large amounts. Lignin is stained yellow by iodine in both aqueous and organic solutions. This yellow color can be removed by washing with the solvent in which the iodine was applied to the lignin, indicating that this is an adsorption color and not the result of chemical reaction. Water and potassium iodide are not necessary for the staining of lignin, nor do they affect the staining to any appreciable degree.

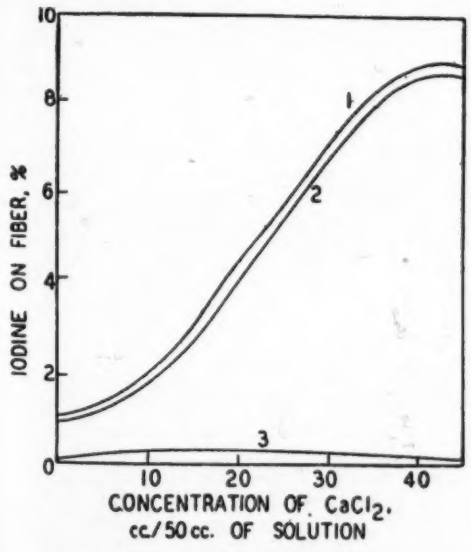

FIG. 4

Effect of Calcium Chloride on Adsorption of Iodine by Bleached Sulphite Pulp. 1. Total; 2. Adsorbed; 3. Combined.

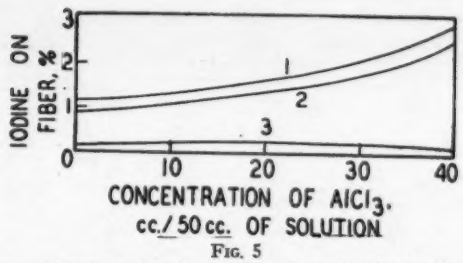

FIG. 5

Effect of Aluminum Chloride on Adsorption of Iodine by Bleached Sulphite Pulp. 1. Total; 2. Adsorbed; 3. Combined.

Carbohydrate materials, such as starch and cellulose, give colors ranging from orange through red and violet to blue, depending upon the condition of the material and the nature of the iodine stain. Water and iodide ions must be present to give these staining reactions. The staining colors of carbohydrate materials change from orange to red to violet to blue with increasing swelling and hydration. Moreover, the formation of these colors requires the presence of available hydroxyl groups, because acetylated and methylated celluloses were found to stain a yellow color with iodine stains. Apparently the staining of carbohydrate materials consists of the formation of adsorption complexes of iodine, iodide, and water in the vicinity of the hydroxyl groups. The adsorption color varies from orange to red to violet to blue as the apparent particle size of the complex is increased. The red color of iodine-iodide on cotton cellulose may be considered the result of adsorption and consequent formation of medium-sized particles on a material which has been only slightly swollen, whereas the blue color on starch is due to the formation of large complexes on the easily hydrated starch micelles. The size of these complexes may be increased by hydration of the adsorbent; they may be decreased by heating or by the addition of a dispersing salt, such as potassium iodide. These blue colors show a strong dichroism, indicating directed adsorption of iodine and hence greater anisotropy and increased specific dichroism.

The chief function of potassium iodide seems to be the formation of an iodine-iodide complex, which makes possible the presence of more iodine in the aqueous stain; this salt is necessary for the staining of cellulosic materials. When present in excess, potassium iodide decreases the size of the iodine adsorption complex, resulting in a change of staining color toward the yellow.

The chief action of zinc chloride, calcium chloride, and aluminum chloride is to swell the cellulosic fiber

and increase the size of the iodine-iodide water adsorption complex. Zinc chloride is most active in this respect, and the other salts follow in the order given above. Apparently, these salts serve the dual purpose of swelling the fiber (thus exposing more hydroxyl groups), and carrying more water into the adsorption complex (thus increasing its apparent particle size and causing a color change toward the blue). All these salts increased the amount of iodine adsorbed on the fiber; hence, the intensity of staining was increased, in addition to the effect of increased iodine adsorption in relation to apparent particle size.

The actions of all these variables appeared to be additive. Fibers containing lignin and cellulose gave colors that were due to both components, although the colors due to lignin tended to predominate wherever the lignin was present in significant quantities. Stains which contained several of the salts, such as the C stain, gave staining reactions that might be considered as an average of the individual reactions of their components.

The action of C stain on some common papermaking fibers may be explained as follows: The color of unbleached sulphite pulp stained with C stain is largely the result of the lignin still present; the change toward violet purple with bleaching is due to the removal of this lignin and the exposure of some of the hydroxyl groups. Similarly, the staining color of unbleached kraft pulp reflects the presence of some available hydroxyls on the surface (because the kraft process removes the middle lamella lignin first) and the presence of considerable lignin within the fiber. Soda pulp stains a red brown with iodine-iodide but stains a blue color when a salt such as zinc chloride is present to help carry water into the fiber along with the iodine-iodide. The action of alkali on the fibers during the cooking of a soda pulp may result in the exposure of more hydroxyl groups (than in the case of sulphite, e.g.), giving a blue color upon staining with an iodine-iodide stain containing zinc chloride. The zinc chloride may be able to carry water into these hydroxyls in spite of the fact that soda pulp is difficult to hydrate. Similarly, alpha pulps are difficult to hydrate, although zinc chloride may be able to carry water into these fibers to form iodine-iodide-water adsorption complexes of about the same size as those formed on cotton, giving a staining color similar to that of cotton.

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Bausch & Lomb at War

With the award of a third star by the Army-Navy Board of Production Awards for outstanding performance, the Bausch & Lomb Optical Company issued a new booklet today, title "Bausch & Lomb At War," which gives some of the record on which the awards were based.

The new book tells how Bausch & Lomb anticipated many of the demands made upon it; how it doubled, tripled, and in some departments quadrupled its forces and increased its shifts to two and three a day; how it leased, rented, constructed, and purchased property outright to provide for its army of workers and equipment.

Some of the scores of optical instruments being delivered to the armed forces are shown in the sixty illustrations—height finders, range finders, battery commander's telescopes, binoculars, searchlight mirrors, stereoscopic trainers, photographic lenses, mapping equipment, gun sights, aviator's goggles, spotting scopes, aerial navigation sextants, mobile optical shops for field service, and microscopes and refraction equipment for the medical services.

The book is a case history of one of the country's most important industries at war—the fourth war in which this 90-year-old company has actively participated.

To Exchange Maintenance Ideas

"Victory Production and Maintenance News," previously issued as "Victory News" by Allis-Chalmers, Milwaukee, Wis., will hereafter endeavor to help industry find out how to keep its production machines running through the rest of the war, the company announces with the release of the new issue.

Inviting an exchange of maintenance ideas from equipment operators, the publication carries these in addition to tips from Allis-Chalmers engineers on the proper maintenance of the hundreds of products manufactured by this company. Emphasis on the value to the war effort of intensifying maintenance is supplemented by production stories in news and pictures, pointing out new ways to increase war production. A handy index lists maintenance articles appearing currently in the leading trade papers.

Maintenance men and executives interested in stepping up maintenance to meet wartime needs in their plants can get this publication regularly by writing the Allis-Chalmers Mfg. Co., Milwaukee, Wisconsin.

Kirk Sutlive Goes with Union Bag

[FROM OUR REGULAR CORRESPONDENT]

SAVANNAH, Ga., March 8, 1943—Kirk Sutlive has become connected with the Public Relations Department of the Union Bag and Paper Corporation at this place. Mr. Sutlive was formerly editor and publisher of the *Blackshear Times* and for the past several months has been junior deputy administrator of the War Savings staff for Georgia.

PAPER MILL CORES
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RHINO

RHINO NON-RETURNABLE

For all uses requiring an extremely tough non-returnable paper mill core.

DURO

DURO—Standard returnable core of plus-standard quality. Shown with Taylor ends. Also available with Bermico ends.

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ENDURO—Very high grade returnable core to meet extra demand for strength. Shown with Bermico ends—Taylor ends available.

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BERMICO—A returnable fibre core—extremely hard, strong and rugged. Treated to resist weather and moisture changes.

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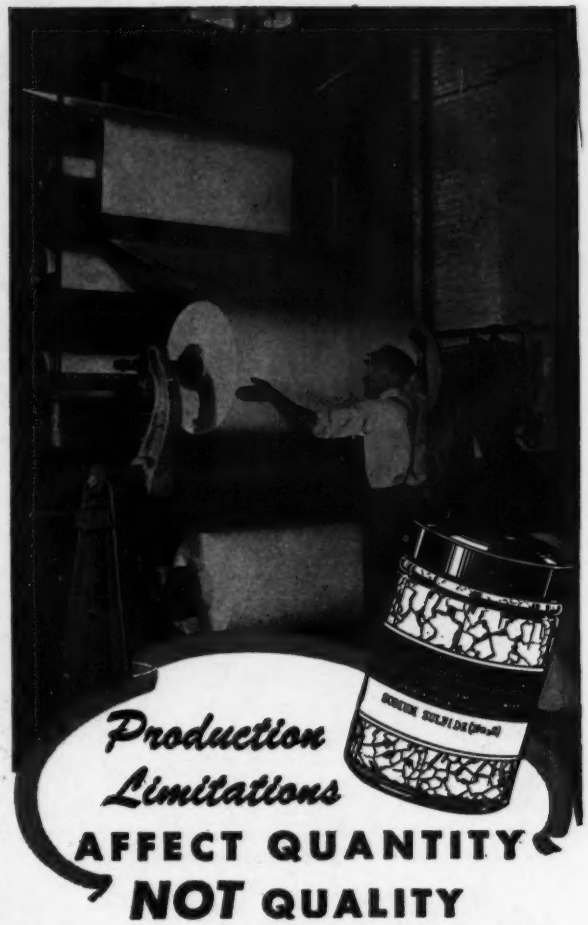

Production Limitations
AFFECT QUANTITY
NOT QUALITY

Restrictions on pulp and paper production may affect the quantity of chemicals you use, but emphasize the importance of their quality. Reduced volume of sales, rising wage scales and labor shortage make it more than ever necessary to promote smooth, sure-footed process control. That means use of chemicals of known properties uniformly maintained—as in HOOKER chemicals—for example:

HOOKER SODIUM SULFIDE (Na_2S)

SPECIFICATIONS
- Light salmon-yellow solid in flake form.
- Contains 60 to 62% Na_2S.
- Less than 1.5% NaCl.
- Less than 2.0% unspecified sodium salts.
- Less than 15 ppm Fe.
- Less than 1 ppm Cu, Ni, Cr, Mn, Pb.
- Remainder, water of crystallization.
- Melts at about 100° C. and gives a clear solution at about 140° C

Other HOOKER chemicals for the pulp and paper field include Bleaching Powder, Caustic Soda, Chlorinated Paraffin, Chlorine, Muriatic Acid, Sodium Sulfhydrate.

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IMPORTS OF PAPER

NEW YORK IMPORTS

WEEK ENDING MARCH 6, 1943

SUMMARY

Filter paper	29 cs.
Drawing paper	12 cs.
Tracing cloth	42 cs.
Tissue paper	9 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., ——, ——, 29 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., ——, ——, 12 cs.

TRACING CLOTH

E. Dietzgen & Co., ——, ——, 14 cs.
Keuffel & Esser Co., ——— ———, 28 cs.

TISSUE PAPER

——, ——, ——, 9 cs.

OPA to Fix Pulpwood Prices

WASHINGTON, D. C., March 10, 1943—Bringing pulpwood produced in the southeastern states under price control for the first time, the Office of Price Administration has placed a 60-day freeze on maximum prices of producers in this area preparatory to establishing specific dollars-and-cents ceilings.

This action has been taken because pulpwood prices in the southeast have been increasing to a level that is seriously endangering ceilings on pulp and paper products, OPA said.

Virginia, North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, and Texas are the states covered by the freeze which is embodied in Temporary Maximum Price Regulation No. 30, effective March 5.

Pulpwood prices have ceilings in only one other part of the country, the Lake Central Area comprising Wisconsin, Minnesota, and Michigan. These ceilings are provided in Maximum Price Regulation No. 257 (Pulpwood Produced in or Sold into the States of Minnesota, Michigan, and Wisconsin) which became effective November 7, 1942. Pulpwood was specifically exempted from the General Maximum Price Regulation.

Maximum prices for the southeastern states are frozen at each seller's highest prices during the five days immediately prior to the issuance of this temporary regulation. This regulation, which continues in effect until midnight, May 4, 1943, specifies also how sellers without sales in this five-day period can establish their ceilings.

The action taken is temporary in nature and will be followed by a permanent Price Regulation which will establish maximum prices at levels consistent with the results of a study of wood, pulp, and paperboard prices in the Southeast, currently being undertaken by OPA.

Michigan Div. to Meet March 18

The next meeting of the Michigan Division of the American Pulp & Paper Mill Superintendents Association will be held Thursday, March 18, at the Park American Hotel in Kalamazoo. Dinner will be served at 6:30. Ernest B. Ghysels, manager of the U. S. Employment Service at Kalamazoo will speak on "Labor Supply and Demand Under the War Man Power Commission." Contact with local industries and their employment problems makes Mr. Ghysels especially well qualified to speak on this topic.

Newton Co. Buys Taylor-Logan Plant

HOLYOKE, Mass., March 8, 1943—Looking forward to the time when they can resume paper manufacture under peace-time conditions, the Newton Paper Company, according to the *Holyoke Transcript*, is taking steps to purchase the land, water power, and buildings of the now-defunct Taylor-Logan Paper Company on Water Street.

The Newton company plans to repair the property and use it for storage until such time as it is practicable to convert it to manufacturing—after the war.

The Reconstruction Finance Corporation, a government loan agency, which took possession of the property some time ago, has sold its interest in the plant to the Newton firm and the City of Holyoke, which has a land court title on the buildings and land for back taxes is to relinquish its interest next Wednesday after the 10-day notice required in such a transaction has expired.

The machinery now installed in the plant is not included in the purchase by the Newton company. According to the agreement signed with the RFC, the government agency must remove the equipment within four months and they are now negotiating for its sale.

Paper Demand Active in Chicago

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 8, 1943—The local paper market continues to go ahead with unabated activity. Prices are very firm in all lines and the paper mills, curtailed in their operations schedules, are having a very difficult time of keeping eager customers even partly supplied. The curtailment, increased labor costs and higher taxes have combined to accentuate the "squeeze" which frozen prices has brought and it becomes more and more obvious that some relief must come soon or mills will be operating almost entirely at a loss.

Kraft markets were stronger than ever with new requirements being asked of kraft producers and distributors. The folding box board market was in the same position. Sulphites found heavy demand in all grades while groundwoods and newsprints were in the top spot of shortages in pulp, which were producing grave effects. Books and covers increased to new activity as buyers continued to rush into the market. Specialties were likewise strong while the waste paper industry is finding it difficult to get man power to do the collection job itself.

New Packaging Specifications Book

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 8, 1943—Considerable interest is being evidenced in the new army and navy specifications for packaging and packing of war materials for overseas shipment which have been released from WPB offices here after preparation by the container coordinating committee. It is a 200-page book with specifications designed to insure proper delivery of war materials in usable conditions and special attention is given to sections discussing adequate protection against corrosion of machine parts and against moisture so that machine parts, assemblies and delicate instruments may be in a satisfactory operating condition when unpacked.

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TENAX FELTS

PROFIT PRODUCERS

FOR THE "DURATION"

That word "duration" has come into frequent use during wartime. It really is an old word with TENAX FELTS. They always enlist for a long tour of duty. They stand up steadfastly to their long lasting job of producing perfect paper and board, — at high speeds. Try TENAX FELTS now!

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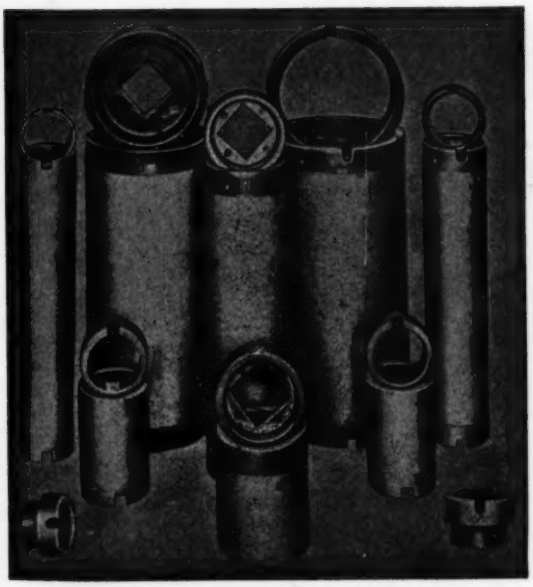
Newfane, N. Y. — U.S.A.



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CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.
CORINTH, N. Y.

New York Paper and Pulp Market Review

WPB Defers 10% Newsprint Cut to July 1—Wood Pulp Market Supply Situation Continues Tight With Easier Market Expected in Future—No. 1 Mixed Paper and No. 1 News at Ceiling Prices.

Office of the PAPER TRADE JOURNAL.
Wednesday, March 10, 1943.

Demand for paper continues very active in the major grades, according to reports received from most of the many manufacturers' representatives, jobbers, and general paper merchants during the current week.

The index of general business activity for the week ended February 27 rose to 140.7, from 136.2 for the preceding week, compared with 136.7 for the corresponding week last year. The index of paper board production was 147.7, compared with 142.9 for the previous week, and with 129.8 for week ended February 28, 1942.

Paper production for the week ended February 27 was estimated at 90.9%, compared with 104.5% for 1942, with 90.5% for 1941, with 83.5% for 1940, and with 83.5% for the corresponding week for 1939.

Paper board production for the week ended February 27 was 94.0%, compared with 100.0% for 1942, with 80.0% for 1941, with 69.0% for 1940, and with 68.0% for the corresponding week for 1939.

WPB Order L-261, issued February 27, concerns the standardization and simplification of grocers' and variety bags. It will reduce the number of sizes from 284 to 117, and the number of stock items from 292 to 122, or a reduction of about 60%. Basic weight of bag paper is reduced 5% and the ream content 4%. Some heavy weight papers are eliminated.

Container board mills were directed by WPB on March 3, to set aside 25% of their monthly kraft and jute container board production for allocation to manufacturers of V-boxes for the armed forces and lend-lease. Any grade of kraft container board used in the above type of box is included, if it uses 50% of virgin sulphate pulp. Jute, straw, chestnut, container chip and bogus corrugating materials are included.

The newsprint situation is clarified by the deferment of the expected April 1 newsprint cut of 10%, to July 1 or later.

Pulpwood

Assurances have been given by the Canadian Timber Controller, A. H. Williamson, that 1,550,000 cords of pulpwood will be shipped to U. S. mills, as directed by the WPB, during 1943.

Wood Pulp

The current chemical wood pulp situation continues tight in all grades. Prime grades of bleached sulphite and sulphate are scarce. The market is firm and active, with the prospect of an easier supply situation in the future, as additional supplies of pulpwood and wood pulp from Canada appear assured.

Rags

Mill buying of new cotton cuttings is reported fair at this date. Supplies are quite widely reported as limited, with reports indicating rising costs in handling cuttings is now a critical factor, accompanied, of course, with the difficult manpower problem.

Roofing rags are firm, with prices maintained at the ceiling schedule. Higher sorting and packing costs are also reported as a major factor in current quotations, although felt mill purchasing is and has been active for some time.

Old Rope and Bagging

All grades of old rope are in heavy demand, with prices firm. Mill buying of No. 1 Manila rope is reported steady at the OPA ceiling price of $115 per ton. The Department of Labor index for old burlap and cordage on January 2, 1943, was 244.1, compared with 249.4 on December 26, 1942, and with a high of 283.0 on May 2 to June 13, 1942, inclusive.

Old Waste Paper

The strong market situation in No. 1 mixed paper during the past two weeks has resulted in a price rise to the OPA ceiling on this grade and a current quotation of $14 per ton. No. 1 news is currently quoted at $15 per ton to mills.

Twine

No important change in the twine market has been reported this week. Prices are firm, with demand active on standard grades of hard and soft fiber twines.

Empire State TAPPI Discusses Corrosion

The Hudson Valley Group of the Empire State Section of the Technical Association of the Pulp and Paper Industry met at the Quensbury Hotel, Glens Falls, N. Y., on March 4th. About fifty attended. F. J. McCourt, of the International Paper Company, presided.

R. T. Barnes, Jr., of the International Nickel Company, New York, N. Y., discussed new nickel alloys being developed for war purposes and which will be available to the industry after the war. E. H. Conway, of the Whitehead Metal Products Company, discussed the use of lighter weight metals for machinery. Foster P. Doane of the Sandy Hill Iron & Brass Works was in charge of arrangements. The next meeting will be held on April 1st at the Queensbury. Those present included:

P. J. Abel, George Adams, R. T. Barnes, Wm. Beazley, C. K. Bosworth, E. H. Conway, W. F. Curtis, F. P. Doane, R. M. Drummond, V. P. Edwardes, H. W. Fales, S. L. Foster, L. G Galleys, T. A. Gastonguay, F. B. Halloran, J. H. Roude, E. Hutchins, R. Jones, J. W. Joslyn, Wm. Leeson, A. A. Lowe, F. J. McCourt, W. D. Mooney, John Morrison, R. D. Moynehan, H. Newell, R. Nielson, J. W. Nixon, G. H. Pountain, Floyd Palmer, Anthony Prestera, W. N. Putnam, Tom Rider, B. Russel, F. J. Sheehan, L. R. Sherman, C. V. Simmons, L. Thompson, R. A. Thompson, M. G. Tibbets, E. J. Trimbey, George K. Walker, Howard West, W. Bradford West, George C. Wolfe and C. G. Wright.

SCREENS for PAPER and PULP MILLS

PERFORMANCE of your Centrifugals, Shakers and Driers definitely improved by the use of precision screens built to your specifications. Let us "sit in" on your screening problems.

The Harrington & King PERFORATING Co.

5652 Fillmore St., Chicago — 114 Liberty St., New York

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Manufacturers of
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KRAFT WRAPPING AND KRAFT ENVELOPE
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More than just a TRADE MARK

EXCELSIOR KNOX Woolen Co. Camden, Me. FELTS & JACKETS

BUT also a guarantee by men who for 78 years have prided themselves in making finer felts. TO YOU —this is the mark of dependability, longer felt life and greater saving.

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Wood Pulp & Paper Agents

60 East 42 Street
New York, N. Y.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, March 10, 1943.

BLANC FIXE—Quotations on blanc fixe are firm and continue unchanged at prevailing market levels. The pulp is currently quoted at $40 per ton in barrels, at works; the powder is offered at $60 per ton, f.o.b. works. Demand reported fair for the week.

BLEACHING POWDER—Prices on bleaching powder are firm. Current demand reported active. Bleaching powder is currently quoted at $2.50 per 100 pounds, in drums, at works.

CASEIN—Quotations on casein are unchanged for the week. Standard domestic casein, 20-30 mesh, is quoted at 19 cents per pound; 80-100 mesh at 19½ cents per pound; all prices in bags, car lots. Argentine casein, 20-30 mesh, is currently quoted at 9 cents per pound, c.i.f. No quotations on French casein.

CAUSTIC SODA—Prices on caustic soda are reported unchanged. Demand for the current week is reported good. Solid caustic soda is currently quoted at $2.30 per 100 pounds, flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Quotations on china clay are firm and continue unchanged. Demand reported fair for the current week. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton at mine. Imported clay is quoted at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine unchanged. Government demand for war use continues heavy. Prices firm. Chlorine is currently quoted at from $1.75 per 100 pounds, in single-unit tank cars, f.o.b. works.

ROSIN — Quotations on some grades of rosin are higher for the current week. "G" gum rosin is currently quoted at $3.49 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at $3.42 per 100 pounds, in barrels, New York. Seventy per cent gum rosin size is quoted at $3.68 per 100 pounds, f.o.b. works.

SALT CAKE—Prices on salt cake are firm. Demand reported moderate for the current week. Domestic salt cake is currently quoted at $15 per ton in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point. Quotations on imported salt cake are nominal at $16 per ton.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market quotations. Demand good. Quotations on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH — Prices on corn starch continue unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds; all prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported fair. The commercial grades are currently quoted at $1.15 per 100 pounds; iron free at from $1.75 to $1.85 per 100 pounds, in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and continue to conform to prevailing market quotations. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $16 to $21 per ton, at mills. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill			
Superstandard Wrapping	$5.00	@	—
No. 1 Wrapping	4.75	"	—
Standard Wrapping	4.50	"	—
Standard Bag	4.125	"	—
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.05	"	—
White No. 1½	1.00	"	—
White No. 2	1.00	"	—
Anti-Tarnish M. G.	.95	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.35	"	—
Bleached, Jr.	2.65	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	5.50	"	5.75
No. 2 Manila Wrapping, 35 lb.	5.25	"	5.50
Boards, per ton—			
News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Lt. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*60.00	"	—
Binders Boards	84.00	"	116.00

*OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	32.20 " 37.75	33.35 " 39.25
85% Rag	.... "	29.90 " 35.00
75% Rag	23.00 " 27.00	24.15 " 28.25
65% Rag	.... "	22.80 " 27.75
50% Rag	18.70 " 22.75	19.90 " 24.25
25% Rag	16.40 " 20.00	17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$10.55@$12.75	$11.70@$14.25
No. 2	9.65 " 11.75	10.80 " 13.25
No. 3	9.20 " 11.25	10.35 " 12.50
No. 4	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.50
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight to Destination.

Bl. Softwood Sulphite	$76.00
Unbl. Softwood Sulphite	65.00@ 66.00
Bl. Hardwood Sulphite	73.50
Unbl. Hardwood Sulphite	63.50
Bl. Mitscherlich	81.00
Unbl. Mitscherlich	72.00
N. Bleached Sulphate	86.00
S. Bleached Sulphate	79.00
N. Semi-Bleached Sulphate	62.00
S. Semi-Bleached Sulphate	75.00
N. Unbl. Sulphate	73.00
S. Unbl. Sulphate	63.50
Bl. Soda	66.00
Unbl. Soda	62.00
Groundwood	46.00

Transportation Allowances

Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1.	6.50	@	6.75
Silesias No. 1	4.50	"	4.75
New Unbleached	6.50	"	6.75
Blue Overall	5.00	"	5.25
Fancy	3.50	"	3.75
Washables	2.75	"	3.00
Mixed Khaki Cuttings	2.75	"	3.00
O. D. Khaki Cuttings	3.25	"	3.50

Twenty-five years ago we were asked to interrupt our manufacturing production and to do our part in helping to win a war.

The call has come to us again and our entire productive capacity has been turned to defense work designed to stop the aggressor.

Replacement parts for equipment manufactured by us, now operating in our customers' plants, will be served promptly, provided the orders for these parts carry proper priorities and meet with the approval of the War Production Board.

Orders for new machines of our standard type will be accepted only if accompanied by proper priorities until the end of the present emergency.

HUDSON-SHARP
MACHINE CO • GREEN BAY • WIS

★ ★

PARIS
BLACKS

BLACKS KNOWN FOR THEIR TONE, STRENGTH AND MISCIBILITY

BLAC-KING 45 RX

An aqueous dispersion of Carbon Black with a solid content of 45%. This product is specially designed for use as a coloring agent for paper. Clean to handle and eliminates possible contamination of other colors in the beater room.

Samples and information on request

UNITED CARBON COMPANY INC.
Charleston, W. Virginia

Special for PAPER

PARIS 2 *Black*

A COLUMBIAN COLLOID

The exceptional tinting strength of Paris 2 Black permits use of a minimum of pigment to obtain desired results.

•

Free from oiliness
Optimum particle size
High tinctorial strength
Ease of dispersion
Ease of handling
Uniformity

•

Use Paris 2 Black in your black and gray paper stocks with assurance.

COMPRESSED OR SEMI-COMPRESSED FOR JET BLACK PAPERS

•

UNCOMPRESSED FOR TINTING GRAY STOCKS

We invite technical inquiry

BINNEY & SMITH CO. DISTRIBUTOR • COLUMBIAN CARBON CO. MANUFACTURER

41 East 42nd St., New York, N. Y.

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Neminal		
Domestic	4.00	@	4.25
Wool Tares, light	4.25	"	4.50
Wool Tares, heavy	4.50	"	4.75
Bright Bagging	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	4.25	"	4.75
Sisal Strings	*3.00	"	4.00
Mixed Strings	1.00	"	1.20

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.57½	"	—
Mixed Books	.85	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Mixed Ledger, colored	1.87½	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.85	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old Kraft Corrugated Containers	1.50	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	.85	"	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—

(Hard Fiber)

Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1	.07¼	@	.07¾
New White No. 2	.04½	"	.05
Light Silesias	.04½	"	.04¾
Silesias, No. 1	.04	"	.04¼
Black Silesias, soft	.03¾	"	.04
New Unbleached	.07¼	"	.07½
Washable Prints	.03¾	"	.03½
Washable No. 1	.02	"	.02¼
Blue Overall	.04½	"	.05½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales	.03¾	"	.03½
New Black Soft	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.	.03	"	.03¼
No. 2 Mixed	.02¼	"	.02½
Corduroy	.01¾	"	.02½
New Canvas	.04¾	"	.05¼
New Black Mixed	—	"	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80	"	—
White No. 2—Repacked	2.90	"	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	"	3.50
Sisal Rope	3.75	"	—
Mixed Rope	.75	"	1.00
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Jute Corrugated Cuttings	.90	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Overissue News	.85	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old Corrugated Containers	1.00	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	3.75	@	—
Sisal Rope No. 1	4.00	"	—
Sisal Rope No. 2	3.00	"	—
Mixed Rope	1.35	"	1.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.75	"	5.25
Jute Carpet Threads	3.25	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.75	"	4.00
Wool Tares—			
Foreign	(nominal)		
Domestic	3.75	"	4.00
Aust. Wool Pouches	4.75	"	5.00
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.50
Paper Mill Bagging	2.50	"	3.00
No. 2 Bagging	1.35	"	—*

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¼	"	.05
New White No 1.	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06½
Underwear Cutters, Bleached	.06¾	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¾
New Black Silesias	.03	"	.03½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¼	"	.03½
New Canvas	.06¼	"	.06¾
B. V. D. Cuttings	.06¼	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—			
Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
* Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.17½	"	—
No. 1 Heavy Books & Magazines	1.67½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—